Repair Assessment for Pressurized Fuselages

Department of Transportation
Federal Aviation Administration

2000

[4910-13-U]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Parts 91, 121, 125, and 129

[Docket No. 29104; Amendment Nos. 91-264, 121-275, 125-33, and 129-28]

RIN 2120-AF81

Repair Assessment for Pressurized Fuselages

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final Rule.

SUMMARY: This action requires operators of certain transport category airplanes to incorporate repair assessment guidelines for the fuselage pressure boundary into their FAA-approved maintenance or inspection program. This action is the result of concern for the continued operational safety of airplanes that are approaching or have exceeded their design service goal. The purpose of the repair assessment guidelines is to establish a damage-tolerance based supplemental inspection program for repairs to detect damage, which may develop in a repaired area, before that damage degrades the load carrying capability of the structure below the levels required by the applicable airworthiness standards.

EFFECTIVE DATE: May 25, 2000.

FOR FURTHER INFORMATION CONTACT: Brent Bandley, Los Angeles Aircraft Certification Office, Airframe Branch, ANM-120L, Transport Airplane Directorate, Federal Aviation Administration, 3960 Paramount Boulevard, Lakewood, California 90712-4137; telephone (562) 627-5237; fax (562) 627-5210.

SUPPLEMENTARY INFORMATION:

Availability of Final Rules

An electronic copy of this document may be downloaded using a modem and suitable communications software from the FAA regulations section of the FedWorld

electronic bulletin board service (telephone: 703-321-3339), or the Government Printing Office's (GPO's) electronic bulletin board service (telephone: (202) 512-1661).

Internet users may reach the FAA's web page at http://www.faa.gov/avr/arm/nprm/nprm.htm or the (GPO) Federal Register web page at http://www.access.gpo.gov/nara for access to recently published rulemaking documents.

Any person may obtain a copy of this document by submitting a request to the Federal Aviation Administration, Office of Rulemaking, ARM-1, 800 Independence Avenue SW., Washington, DC 20591, or by calling (202) 267-9680. Communications must identify the amendment or docket number of this final rule.

Persons interested in being placed on a mailing list for future rulemaking documents should request from the above office a copy of Advisory Circular No. 11-2A, "Notice of Proposed Rulemaking Distribution System," which describes the application procedure.

Small Business Regulatory Enforcement Fairness Act

The Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996, requires the FAA to comply with small entity requests for information or advice about compliance with statutes and regulations within our jurisdiction. Therefore, any small entity that has a question regarding this document may contact their local FAA official. Internet users can find additional information on SBREFA on the FAA's web page at http://faa.gov/avr/arm/sbrefa/htm and may send electronic inquiries to the following Internet address: 9-AWA-SBREFA@faa.gov.

Background

On December 22, 1997, the FAA issued Notice of Proposed Rulemaking (NPRM) 97-16, which was published in the Federal Register on January 2, 1998 (98 FR 126). That NPRM proposed to prohibit the operation of certain transport category airplanes (operated under 14 CFR parts 91, 121, 125, and 129) beyond a specified time, unless the operator of the airplane incorporated FAA-approved "repair assessment guidelines" into

its approved maintenance inspection program. The FAA provided a period of 90 days for the public to submit input on the proposed rule. On April 3, 1998 (63 FR 16452), the FAA reopened the period for public comment for an additional 90 days. (A discussion of the comments received in response to the NPRM appears below.)

The repair assessment guidelines, which are to be approved by the FAA for each airplane model affected by this rule, contain:

> a methodology for assessing the types of repairs expected to be found in the fuselage pressure boundary (fuselage skins, bulkhead webs, and door skin), and
>
> methods to determine the damage-tolerance characteristics of the surveyed repairs.

Each of the guidelines contains repetitive repair inspection intervals that are based on residual strength, crack growth, and inspectability evaluations, and are closely compatible with typical operator maintenance practices (i.e., C-checks, D-checks, etc.).

In addition to this final rule, the FAA has developed an associated advisory circular (AC), "Repair Assessment of Pressurized Fuselages." The AC provides guidance for operators of the affected transport category airplanes on how to incorporate FAA-approved repair assessment guidelines into their FAA-approved maintenance or inspection program as a means to comply with this final rule. Availability of the AC will be announced in Federal Register in the near future.

Issues Prompting this Rulemaking Activity

In April 1988, a high-cycle transport airplane enroute from Hilo to Honolulu, Hawaii, suffered major structural damage to its pressurized fuselage during flight. This accident was attributed in part to the age of the airplane involved. The economic benefit of operating certain older technology airplanes has resulted in the operation of many such airplanes beyond their previously projected retirement age. Because of the problems revealed by the accident in Hawaii and the continued operation of older airplanes, both

the FAA and industry generally agreed that increased attention needed to be focused on the aging fleet and on maintaining its continued operational safety.

In June 1988, the FAA sponsored a conference on aging airplanes. As a result of that conference, the FAA established a task force in August 1988 as a sub-group of the FAA's Research, Engineering, and Development Advisory Committee, representing the interests of the aircraft operators, aircraft manufacturers, regulatory authorities, and other aviation representatives. The task force, then known as the Airworthiness Assurance Task Force (AATF), set forth five major elements of a program for each airplane model in the aging transport fleet that would serve to keep the aging fleet safe:

> Select service bulletins describing modifications and inspections necessary to maintain structural integrity;
>
> Develop inspection and prevention programs to address corrosion;
>
> Develop generic structural maintenance program guidelines for aging airplanes;
>
> Review and update the Supplemental Structural Inspection Documents (SSID) which describe inspection programs to detect fatigue cracking; and
>
> Assess damage-tolerance of structural repairs.

By Federal Register notice, dated November 30, 1992 (57 FR 56627), the AATF was placed under the auspices of the Aviation Rulemaking Advisory Committee (ARAC) and renamed as the Airworthiness Assurance Working Group (AAWG). Structures Task Groups, sponsored by the AAWG, were assigned the task of developing the five elements into workable programs. The AAWG completed work on the first four of the elements listed above at the time Notice 97-16 was issued. Issuance of this final rule completes the fifth element..

This final rule addresses the specific task assigned to the AAWG relevant to the fifth element, which was to develop recommendations concerning whether new or revised

requirements and compliance methods for structural repair assessments of existing repairs should be initiated and mandated for the following airplanes:

Airbus Model A300 (excluding the -600 series);

British Aerospace Model BAC 1-11;

Boeing Models 707/720, 727, 737, and 747;

McDonnell Douglas Models DC-8, DC-9/MD-80, and DC-10;

Fokker Model F-28; and

Lockheed Model L-1011.

Related Regulatory Activity

In addition to these initiatives, there are other on-going activities associated with FAA's Aging Aircraft Program.

The Aging Aircraft Safety Act of 1991 (Public Law 49 U.S.C. 44717) instructed the FAA Administrator to prescribe regulations that will ensure the continuing airworthiness of aging aircraft through inspections and reviews of the maintenance records of each aircraft an air carrier uses in air transportation. In response, the FAA published Notice 93-14 (58 FR 51944, October 5, 1993)). Among other things, that notice proposed to require operators to:

certify aging airplane maintenance actions;

establish a framework for imposing operational limits on certain airplanes; and

perform additional maintenance actions, such as inspections or parts replacements, in order to continue operating the airplane.

The FAA subsequently withdrew Notice 94-14, and issued a new Notice 99-02 (64 FR 16298, April 2, 1999). The new notice proposes to require that all airplanes operating under parts 121, 129, and 135 undergo records reviews and inspections after their 14th year in service to ensure that the maintenance of these airplanes' age-sensitive parts and components has been adequate and timely. The proposed new rule also would

prohibit operation of these airplanes after specified deadlines, unless damage-tolerance-based inspections and procedures are included in their maintenance or inspection program. The period for public comment on the proposal ended on August 2, 1999, and the FAA anticipates regulatory action in the near future.

In addition, the FAA has found that some operators do not have a programmatic approach to corrosion prevention and control programs (CPCP). In its accident investigation report (NTSB/AAR-89/03) on the Hawaii accident, the NTSB recommended that the FAA mandate a comprehensive and systematic CPCP. Therefore, the FAA is considering rulemaking to mandate CPCP's for all airplanes used in air transportation. As part of that deliberation, the FAA is considering the CPCP's recommended by the AATF and previously mandated by the FAA through airworthiness directives (AD); all of the airplanes affected by this proposal currently are subject to those AD's.

The Concern Posed by Older Repairs

The basic structure of the large jet transports that are affected by this final rule was required at the time of original certification to meet the applicable regulatory standards for fatigue or fail-safe strength. Repairs and modifications to this structure also were required to meet these same standards. The early fatigue or fail-safe requirements, however, did not provide for timely inspection of critical structure so that damaged or failed components could be dependably identified and repaired or replaced before a hazardous condition developed.

By amendment 25-45 (43 FR 46242, October 5, 1978), the FAA amended § 25.571 ("Damage-tolerance and fatigue evaluation of structure") by introducing a new certification requirement called "damage-tolerance" to assure the continued structural integrity of transport category airplanes certificated after that time. Additionally, for existing designs, guidance material based on that amendment was published in 1981 as

Advisory Circular (AC) 91-56, "Supplemental Structural Inspection Program for Large Transport Category Airplanes."

Damage-tolerance is a structural design and inspection methodology used to maintain safety, considering the possibility of metal fatigue or other structural damage (i.e., safety is maintained by adequate structural inspection until the damage is repaired). The underlying principle for damage-tolerance is that the initiation and growth of structural fatigue damage can be anticipated with sufficient precision to allow inspection programs to safely detect damage before it reaches a critical size. A damage-tolerance evaluation entails:

> the prediction of sites where fatigue cracks are most likely to initiate in the airplane structure;
>
> the prediction of the crack growth under repeated airplane structural loading;
>
> the prediction of the size of the damage at which strength limits are exceeded; and
>
> an analysis of the potential opportunities for inspection of the damage as it progresses.

Information from the evaluation is used to establish an inspection program for structure, which, if rigorously followed, will be able to detect cracking that may develop before it precipitates a major structural failure. The evidence to date is that, when all critical structure is included, the damage-tolerance concept and the supplemental inspection programs that are based on it provide the best assurance of continued structural integrity that currently is available.

In order to apply the damage tolerance concept to existing transport airplanes, the FAA issued a series of AD's, beginning in 1984, that require operators to comply with supplemental structural inspection programs resulting from the concept's application to existing airplanes. Nearly all of the airplane models affected by this final rule currently

are subject to such AD's. Generally, those AD's require that operators incorporate Supplemental Structural Inspection Documents (SSID) into their maintenance programs for the affected airplanes. These documents were derived from damage-tolerance assessments of the originally-certificated type designs for these airplanes. For this reason, the majority of AD's written for the SSID program did not attempt to address issues relating to the damage-tolerance of repairs that had been made to the airplanes. The objective of this final rule is to provide that same level of assurance for areas of the structure that have been repaired.

Repairs are a concern on older airplanes because of the possibility that they may develop, cause, or obscure metal fatigue, corrosion, or other damage during service. This damage might occur within the repair itself or in the adjacent structure, and might ultimately lead to structural failure. The damage-tolerance evaluation of a repair would be used in an assessment program to establish an appropriate inspection program, or a replacement schedule if the necessary inspection program is too demanding or not possible. The objective of the repair assessment is to assure the continued structural integrity of the repaired and adjacent structure based on damage-tolerance principles.

In general, repairs present a more challenging problem to solve than the original structure because each repair is unique and tailored in design to correct particular damage to the original structure. Whereas the performance of the original structure may be predicted from tests and from experience on other airplanes in service, the behavior of a repair and its effect on the fatigue characteristics of the original structure are generally not known to the same extent as for the basic unrepaired structure.

The available service record and surveys of out-of-service and in-service airplanes have indicated that existing repairs generally perform well. Although the cause of an airplane accident has never been attributed to properly applied repairs using the original repair data, repairs may be of concern as time-in-service increases for the following reasons:

1. As airplanes age, both the number and age of the existing repairs increase. Along with this increase is the possibility of unforeseen repair interaction, autogenous failure, or other damage occurring in the repaired area. The continued operational safety of these airplanes depends primarily on a satisfactory maintenance program (inspections conducted at the right time, in the right place, using the most appropriate technique). To develop this program, a damage-tolerance evaluation of repairs to flight critical structure is essential. The longer an airplane is in service, the more important this evaluation and a subsequent inspection program become.

2. The practice of damage-tolerance methodology has evolved gradually over the last 20 or more years. Some repairs described in the airplane manufacturers' Structural Repair Manuals (SRM) were not designed to current standards. Repairs accomplished in accordance with the information contained in the early versions of the SRM's may require additional inspections if evaluated using the current methodology.

3. Because a regulatory requirement for damage-tolerance was not applied to airplane designs type certificated before 1978, the damage-tolerance characteristics of repairs may vary widely and are largely unknown.

Development of "Repair Assessment Guidelines"

To address the ARAC assignment relative to repairs, the AAWG tasked the manufacturers to develop "repair assessment guidelines (RAG)" requiring specific maintenance programs to maintain the damage-tolerance integrity of the basic airframe. The following criteria were developed to assist the manufacturers in the development of the guidance material:

> Repairs that do not conform to SRM standards must be reviewed and may require further action.
>
> Repairs must be reviewed where the repair has been installed in accordance with SRM data that have been superseded or rendered inactive by new damage-tolerant designs.

Repairs that are in close proximity to other repairs or modifications require review to determine their impact on the continued airworthiness of the airplane.

Repairs that exhibit structural distress should be replaced before flight.

To identify the scope of the overall program, fleet data were required. This resulted in the development of a five-step program to develop factual data for the development of the rule. The five-step AAWG program consisted of:

Step 1. Development of model specific RAG's using AAWG repair criteria.

Step 2. Completion of a survey of a number of operators' airplanes to assess fuselage skin repairs and to validate the approach of the manufacturer's RAG.

Step 3. Determination of the need for and the development of a worldwide survey.

Step 4. Collection and assessment of results to determine further necessary actions.

Step 5. Development of specific manufacturer/operator/FAA actions.

Early in the development of this task, each manufacturer began to prepare model-specific RAG's. When sufficiently developed, these draft guidelines were shared with the operators to get feedback on acceptability and suggestions for improvement. The operators stressed the need for commonality in approach and ease of use of the guidelines. They also expressed the need for guidelines that could be used on the shop floor without engineering assistance and without extensive training.

Meanwhile, the AAWG conducted two separate surveys of existing repairs on airplanes to collect necessary data. The first survey was conducted in March 1992 on certain large transport category airplanes being held in storage. Teams comprised of engineering representatives from various organizations, including FAA's Aircraft Certification and Flight Standards offices, operators, and manufacturers, surveyed 356

external fuselage skin repairs on 30 airplanes of 6 types. Using repair classification criteria developed by the individual airplane manufacturers, the teams concluded that the general quality of the repairs appeared good. Forty percent of the repairs were adequate, requiring no supplemental inspections, and sixty percent needed a more comprehensive damage-tolerance based assessment, with the possibility that supplemental inspections might be needed. Some determining factors on the need for further assessment were the size of the repair and its proximity to other repairs. While the survey sample size was very small compared to the total population of transport airplanes type certificated prior to 1978, it provided objective information on the quality and damage-tolerance characteristics of existing airplane repairs.

In 1994, the AAWG requested that the manufacturers conduct a second survey on airplane repairs to validate the 1992 results and to provide additional information relative to the estimated cost of the assessment program. The manufacturers were requested to visit airlines that were operating their products and to conduct surveys on airplanes that were currently undergoing heavy maintenance. An additional 35 airplanes were surveyed in which 695 repairs were evaluated. This survey was expanded to include all areas of the airframe. The evaluation revealed substantially similar results to the 1992 results: forty percent of the repairs were classified as adequate, and sixty percent of the repairs required consideration for additional supplemental inspection during service. In addition, only a small number of repairs (less than 10 percent) were found on portions of the airframe other than the external fuselage skin.

The AAWG proposed that the repair assessment be initially limited to the fuselage pressure boundary; if necessary, future rulemaking would address the remaining primary structure. This limitation was based on two considerations:

First, the fuselage is more sensitive to structural fatigue than other airplane structure because its normal operating loads are closer to its limit design loads. Stresses in a fuselage are primarily governed by the pressure relief valve settings of the

environmental control system, and these are less variable from flight to flight than the gust or maneuver loads that typically determine the design stresses in other structure.

Second, the fuselage is more prone to damage from ground service equipment than other structure and requires repair more often. The result of the second survey described above supports the conclusion that repairs to the fuselage are far more frequent than to any other structure.

Determining Which Airplanes Should Be Affected

This final rule and the repair assessment guidelines apply to 11 large transport category airplane models. (In the original ARAC task, the Boeing Models 707 and 720 were counted as one model. This final rule addresses the 707 and 720 models separately due to their different flight cycle implementation times.) The reason for this limitation is that the original tasking to the ARAC limited the scope of the work to the 11 oldest models of large transport category airplanes then in regular service. This tasking identified those airplanes for which the greatest concern exists as to the status of primary structure repairs. Derivatives of the original airplane models are covered to the extent that the structure has not been upgraded to meet damage-tolerance requirements.

Those transport category airplanes that have been certificated to regulatory standards that include the requirements for damage-tolerant structure under § 25.571 are not included in this rulemaking action. These later requirements make it incumbent on the operating certificate holder to return the structure to the original certification basis by installing only those repairs that meet the airplane's damage-tolerant certification basis. The AAWG, in its final report on this subject, did recommend continued monitoring of repairs on the newer airplanes, with the possibility of additional rulemaking if conditions warrant. (A copy of the AAWG's final report is included in the public docket for this rulemaking.)

It was from this activity that the AAWG and manufacturers recognized not only the need for a RAG document for each affected model, but a SRM updated to include the results of a damage-tolerance assessment.

Considerations in Developing and Mandating Repair Assessment Guidelines

In considering the establishment of RAG's, the AAWG recognized that the guidelines would add to existing repair approval data and, in some cases, may even appear to be in conflict with that data. All repairs assessed under the requirements of this final rule should have been previously approved by the FAA using an FAA-approved SRM, an FAA-approved Service Bulletin, or a repair scheme approved by either an FAA Designated Engineering Representative or an SFAR 36 authorization holder. To avoid the appearance of conflicts between FAA approved data sources, the manufacturers have agreed to update the affected SRM's, as well as repairs identified in Service Bulletins, to determine requirements for supplemental inspections, if not already addressed.

Another consideration was that structural modifications and repairs mandated by AD's do not always contain instructions for future supplemental inspection requirements. The manufacturers have agreed to evaluate the need for post modification inspections for these mandated modifications and repairs. A list of Service Bulletins that are the subject of AD's will be contained in the model-specific RAG documents, with required post-modification/repair inspection programs, as appropriate. A list of other structural Service Bulletins will be provided in the model-specific RAG document, with associated inspection thresholds and repeat intervals. The manufacturers have agreed to complete their review of Service Bulletins related to skin repairs in conjunction with the initial SRM updates.

These agreements notwithstanding, there is still a possibility that the requirements in the RAG document will not agree with those in an AD, especially if the AD was written to address a modification to the airplane made by someone other than the original manufacturer. Federal Aviation Regulations require that compliance be shown with both

the AD and this final rule. Such dual compliance can be avoided in the longer term by working with the manufacturer, if that is the source of difficulty, or by securing an Alternative Method of Compliance (AMOC) to the AD. In the short term, compliance with the earlier threshold, shorter repeat inspection interval or more stringent rework/replace schedule would always constitute compliance with the less stringent requirement. Thus, the operator would not be faced with an unresolvable conflict.

Another consideration, and one that the AATF originally recommended, was that the use of RAG's be mandated by an AD. The FAA concluded that an unsafe condition necessitating AD action had not been established for repairs, and this position is supported by both repair surveys. However, the FAA also considered, and the AAWG agreed, that the long term concern with repairs on older airplanes, as described earlier, does warrant regulatory action, and this final rule addresses that concern.

The AAWG also recognized that the concerns discussed above for the safety of existing repairs also would apply to the long-term safety of future repairs to these airplanes. Therefore, the AAWG considered that new repairs also should be subject to damage-tolerance assessments. It is expected that most new repairs will be installed in accordance with an FAA-approved SRM that has been updated to include this damage-tolerance assessment. However, in the event that a new repair is installed for which no such assessment has been made or is available, the repair assessment guidelines prepared to meet the requirements of this final rule should be used. The intent of this final rule is that all repairs to the fuselage pressure boundary will be evaluated for damage-tolerance, and that any resulting inspection schedule will be specified and the work accomplished, regardless of when, where, or by whom the repair was installed.

Development of Repair Assessment Methodology

The next step in the AAWG's program for this task was to develop a repair assessment methodology that is effective in evaluating the continued airworthiness of existing repairs for the fuselage pressure boundary on affected transport category airplane

models. Older airplane models may have many structural repairs, so the efficiency of the assessment procedure is an important consideration. In the past, evaluation of repairs for damage-tolerance would require direct assistance from the manufacturer. The size of an assessment task conducted in that way would be unmanageable considering that:

each repair design is different,

each airplane model is different,

each area of the airplane is subjected to a different loading environment, and

the number of engineers qualified to perform a damage-tolerance assessment is small.

Therefore, a new approach was developed.

Since repair assessment results will depend on the model-specific structure and loading environment, the manufacturers were tasked to create an assessment methodology for the types of repairs expected to be found on each affected airplane model. Since the records on most of these repairs are not readily available, locating the repairs necessitates surveying the structure of each airplane. A survey form was created that may be used to record key repair design features needed to accomplish a repair assessment. Airline personnel not trained as damage-tolerance specialists can use the form to document the configuration of each observed repair.

Using the information gathered during the survey as input data, the manufacturers have developed simplified methods to determine the damage-tolerance characteristics of the surveyed repairs. Although the repair assessments should be performed by well-trained personnel familiar with the model specific repair assessment guidelines, these methods enable an engineer or technician, not trained as a damage-tolerance specialist, to perform the repair assessment without the assistance of the manufacturer.

From the information gathered during the survey, it is also possible to classify repairs into one of three categories:

Category A: A permanent repair for which the baseline zonal inspection (BZI), (typical maintenance inspection intervals assumed to be performed by most operators), is adequate to ensure continued airworthiness (inspectability) equal to the unrepaired surrounding structure.

Category B: A permanent repair that requires supplemental inspections to ensure continued airworthiness.

Category C: A temporary repair that will need to be reworked or replaced prior to an established time limit. Supplemental inspections may be necessary to ensure continued airworthiness prior to this limit.

The airplane manufacturers generated this methodology and are preparing model-specific repair assessment guidelines for the 11 aging airplane models affected by this final rule. The manufacturers chose to produce the model-specific repair assessment guidelines for the older models first, and to produce those for the newer models as those airplanes get closer in age to the implementation time. (Operators should be in contact with the manufacturers to obtain a schedule of when the repair assessment guidelines will be prepared for their specific airplane models.) Uniformity and similarity of these repair assessment procedures between models has been an important factor to consider in simplifying operator workload. The manufacturers have spent considerable time over the last several years to achieve commonality of the repair assessment process.

The inspection intervals contained in the FAA-approved model specific RAG documents are based on residual strength, crack growth, and inspectability evaluations. The manufacturers have endeavored to make the inspection methods and intervals compatible with typical operator maintenance practice. Thus, internal inspections would be acceptable at flight cycle limits that are equivalent to D-check intervals, while simpler external inspections could be accommodated at flight cycle limits that are generally equivalent to C-check intervals. If the inspection method and intervals for a given repair

are not compatible with the operator's maintenance schedule, the repair could be replaced with a more damage-tolerant repair.

These guidelines can also be used for evaluating the damage-tolerance characteristics of new repairs for continued airworthiness.

Related Activity Affecting Structural Repair Manuals

In order to further facilitate the assessment process, the manufacturers have agreed to update model-specific SRM's to reflect damage-tolerance repair considerations. Their goal is to complete these updates by the first revision cycle of the model-specific SRM after the release of the associated RAG document. Consistent with the results of the surveys, only fuselage pressure boundary repairs are under consideration.

The general section of each SRM, Chapter 51, will contain brief descriptions of damage-tolerance considerations, categories of repairs, description of baseline zonal inspections, and the repair assessment logic diagram. Chapter 53 of the SRM for pressurized fuselage skin will be updated to identify repair categories and related information.

In updating each SRM, existing location-specific repairs should be labeled with appropriate repair category identification (A, B, or C), and specific inspection requirements for B and C repairs also should be provided, as applicable.

Structural Repair Manual descriptions of generic repairs also will contain repair category considerations regarding size, zone, and proximity. Detailed information for determination of inspection requirements will be provided in separate RAG documents for each model. Repairs that were installed in accordance with a once-current SRM, but that have now been superseded by a new damage-tolerant design, will require review. Such superseded repairs may be reclassified to Category A, B, or C. Category B or C repairs would require additional inspections and/or rework.

Repair Assessment Process

There are two principal techniques that can be used to accomplish the repair assessment. The first technique involves a three-stage procedure. This technique could be well-suited for operators of small fleets. The second technique involves the incorporation of the RAG as part of an operator's routine maintenance program. This approach could be well-suited for operators of large fleets and would evaluate repairs at predetermined planned maintenance visits as part of the maintenance program.

Manufacturers and operators also may develop other techniques, which would be acceptable as long as they fulfill the objectives of this rule and are FAA approved.

The first technique generally involves the execution of the following three stages:

· Stage 1. Data Collection**:** This stage specifies what structure should be assessed for repairs and collects data for further analysis. If a repair is on a structure in an area of concern, the analysis continues; otherwise, the repair does not require classification per this program. Repair assessment guidelines for each model will provide a list of structure for which repair assessments are required. Some manufacturers have reduced this list by determining the inspection requirements for critical details. If the requirements are equal to normal maintenance checks (e.g., BZI checks), those details were excluded from this list. Repair details are collected for further analysis in Stage 2. Repairs that do not meet the static strength requirements or are in a bad condition are immediately identified, and corrective actions must be taken before further flight.

· Stage 2. Repair Categorization**:** The repair categorization is accomplished by using the data gathered in Stage 1 to answer simple questions regarding structural characteristics. If the maintenance program is at least as rigorous as the BZI identified in the manufacturer's model specific RAG, well-designed repairs in good condition meeting size and proximity requirements are designated as Category A. Simple condition and design criteria questions are provided in Stage 2 to define the lower bounds of Category B and Category C repairs. The process continues for Category B and C repairs.

· Stage 3. Determination of Structural Maintenance Requirements**:** The supplemental inspection and/or replacement requirements for Category B and C repairs are determined in this stage. Inspection requirements for the repair are determined by calculation or by using predetermined values provided by the manufacturer, or other values obtained using an FAA-approved method. In evaluating the first supplemental inspection, Stage 3 defines the inspection threshold in flight cycles measured from the time of repair installation. If the time of installation of the repair is unknown and the airplane has exceeded the assessment implementation times or has exceeded the time for first inspection, the first inspection should occur by the next C-check interval, or equivalent cycle limit after the repair data is gathered (Stage 1).

An operator may choose to accomplish all three stages at once, or just Stage 1. In the latter case, the operator would be required to adhere to the schedule specified in the FAA-approved model-specific RAG for completion of Stages 2 and 3.

Incorporating the maintenance requirements for Category B and C repairs into an operator's individual airplane maintenance or inspection program completes the repair assessment process for the first technique.

The second technique involves setting up a repair maintenance program to evaluate all fuselage pressure boundary repairs at each predetermined maintenance visit to confirm that they are permanent. This technique requires the operator to choose an inspection method and interval in accordance with the FAA-approved RAG. The repairs whose inspection requirements are fulfilled by the chosen inspection method and interval would be inspected in accordance with the regular FAA-approved maintenance program. Any repair that is not permanent, or whose inspection requirements are not fulfilled by the chosen inspection method and interval, would either be: (1) upgraded to allow utilization of the chosen inspection method and interval, or (2) individually tracked to account for the repair's unique inspection method and interval requirements. This process is then repeated at the chosen inspection interval.

Repairs added between the predetermined maintenance visits, including interim repairs installed at remote locations, would be required either to have a threshold greater than the length of the predetermined maintenance visit or to be tracked individually to account for the repair's unique inspection method and interval requirements. This would ensure the airworthiness of the structure until the next predetermined maintenance visit, at which time the repair would be evaluated as part of the repair maintenance program.

Whichever technique is used, there may be some repairs that cannot easily be upgraded to Category A due to cost, downtime, or technical reasons. Such repairs will require supplemental inspections, and each operator should make provisions for this when incorporating the RAG into its maintenance program.

Repair Assessment Implementation Time

The implementation time for the assessment of existing repairs is based on the findings of the repair surveys and fatigue damage considerations, described previously. As discussed, the repair survey findings indicated that all of repairs reviewed appeared to be in generally good structural condition. This tended to validate the manufacturer's assumptions in designing both the repair and the basic structure. Since the manufacturer had based the design stress levels on a chosen Design Service Goal (DSG), it was concluded that the repair assessment needed to be implemented sometime before a specific model reached its DSG. Based on this logic, the manufacturers and operators established an upper boundary for an assessment to be completed, and then reduced it to establish an "implementation time," defined as 75% of DSG in terms of flight cycles.

Therefore, under this approach, incorporation of the RAG into an airplane's maintenance or inspection program ideally should be accomplished before an airplane accumulates 75% of its DSG. After the guidelines are incorporated into the maintenance or inspection program, operators should begin the assessment process for existing fuselage repairs within the flight cycle limit specified in the FAA-approved model-

specific RAG. There are three "deadlines" for beginning the repair assessment process, depending on the cycle age of the airplane on the effective date of the rule.

1. Airplane cycle age equal to or less than implementation time on the rule effective date: The operator is required to incorporate the guidelines into its maintenance or inspection program by the flight cycle implementation time, or one year after the effective date of the rule, whichever occurs later. The assessment process begins (e.g., accomplishment of Stage 1) on or before the flight cycle limit specified in the RAG after incorporation of the guidelines. (The flight cycle limits are expressed in flight cycle numbers, but are generally equivalent to a D-check.)

2. Airplane cycle age greater than the implementation time but less than the DSG on the rule effective date: The operator is required to incorporate the guidelines into its maintenance or inspection program within one year of the rule effective date. The assessment process then begins (e.g., accomplishment of Stage 1) on or before the flight cycle limit specified in the RAG (this flight cycle limit is generally equivalent to a D-check), not to exceed another specified flight cycle limit (computed by adding the DSG to the flight cycle limit equivalent of a C-check) after incorporation of the guidelines.

3. Airplane cycle age greater than the DSG on the rule effective date: The operator is required to incorporate the guidelines in its maintenance or inspection program within one year after the effective date of the rule. The assessment process would begin (e.g., accomplishment of Stage 1) on or before the flight cycle limit specified in the RAG (generally equivalent to a C-check) after incorporation of the guidelines.

In each of these three cases, the assessment process will have to be completed, the inspections conducted, and any necessary corrective action taken, all in accordance with the schedule specified in the FAA-approved RAG document.

Discussion of the Final Rule

This final rule is intended to ensure that a comprehensive assessment for damage-tolerance be completed for fuselage pressure boundary repairs, and that the resulting

inspections, modifications, and corrective actions (if any) be accomplished in accordance with the model-specific RAG. To comply with this, the operator will need to consider the following:

Consideration 1.

The means by which the FAA-approved RAG's are incorporated into a certificate holder's FAA-approved maintenance or inspection program is subject to approval by the certificate holder's Principal Maintenance Inspector (PMI) or other cognizant airworthiness inspector.

Consideration 2.

The FAA Aircraft Certification Office (ACO) having cognizance over the type certificate of the airplane must approve the RAG.

Consideration 3.

This final rule will not impose any new reporting requirements; however, normal reporting required under 14 CFR § 121.703 will still apply.

Consideration 4.

This final rule will not impose any new FAA recordkeeping requirements. However, as with all maintenance, the current operating regulations (e.g., 14 CFR § 121.380) already impose recordkeeping requirements that will apply to the actions required by this final rule. When incorporating the RAG into its approved maintenance program, each operator should address the means by which it will comply with these recordkeeping requirements. That means of compliance, along with the remainder of the program, will be subject to approval by the PMI or other cognizant airworthiness inspector.

Consideration 5.

The scope of the assessment is limited to repairs on the fuselage pressure boundary (which includes fuselage skin, door skin, and pressure webs). A list of Service Bulletins that are the subject of AD's will be contained in the model-specific RAG with

required post modification/repair inspection programs, as required. A list of other structural Service Bulletins will be provided in the model-specific RAG with associated inspection threshold and repeat intervals.

Consideration 6.

The RAG's provided by the manufacturer do not generally apply to structure modified by a Supplemental Type Certificate (STC). However, the operator will still be responsible to provide RAG's applicable to the entire fuselage external pressure boundary that meets the program objectives specified in the advisory circular (AC) associated with this final rule (which will be available in the near future). This means that the operator should develop, submit, and gain FAA approval of guidelines to evaluate repairs to such structure.

The FAA recognizes that operators usually do not have the resources to determine a DSG or to develop RAG's, even for a very simple piece of structure. The FAA expects the STC holder to assist the operators in preparing the required documents. If the STC holder is out of business, or is otherwise unable to provide assistance, the operator will have to acquire the FAA-approved guidelines independently. To keep the airplanes in service, it is always possible for operators, individually or as a group, to hire the necessary expertise to develop and gain approval of RAG's and the associated DSG. Ultimately, the operator remains responsible for the continued safe operation of the airplane.

The cost and difficulty of developing guidelines for modified structure may be less than that for the basic airplane structure for three reasons:

First, the only modifications made by persons other than the manufacturer that are of concern in complying with this final rule are those that affect the fuselage pressure boundary. Of those that do affect this structure, many are small enough to qualify as Category A repairs under the RAG, based solely on their size.

Second, if the modified structure is identical or very similar to the manufacturer's original structure, then only a cursory investigation may be necessary. In such cases, the manufacturer's RAG may be shown to be applicable with few, if any, changes. If the operator determines that a repair to modified structure can be evaluated using the manufacturer's model-specific RAG, that determination should be documented and submitted to the operator's PMI or other cognizant airworthiness inspector for approval. For all other repairs, a separate program will need to be developed.

Third, the modification may have been made so recently that no RAG will be needed for many years. Compliance with this final rule could be shown by:

> establishing the DSG for the new modified structure,
>
> calculating an implementation time that is equal to three quarters of that DSG, and
>
> then adding a statement to the operations specifications for part 121, 125 and 129 operators that the RAG will be incorporated into the maintenance or inspection program by that time. For part 91 operators, the inspection program will be revised to include the RAG.

If the modified structure is very similar to the original, then the DSG for the modified structure may also be very similar. No RAG would be needed until 75% of that goal is reached. For example, in the case of a large cargo door, such installations are often made after the airplane has reached the end of its useful life as a passenger-carrying airplane. For new structure, the clock would start on repair assessment at the time of installation. Further, since the DSG is measured in cycles, and cargo operation usually entails fewer operational cycles than passenger operations, the due date for incorporation of the RAG for that structure could be many years away.

Compliance with this final rule requires that conditions such as those described above be properly documented in each operator's FAA-approved maintenance program; however, the FAA considers that the cost of doing so should not be significant. There

should be very few examples where the STC holder is unavailable, and the operators would have to bear the cost of developing a complete RAG document. Guidance on how to comply with this aspect of the rule is discussed in the soon-to-be-released AC associated with this rule.

Consideration 7.

An operator's repair assessment program will have to include damage-tolerance assessments for new repairs. Repairs made in accordance with the revised version of the SRM would already have a damage-tolerance assessment performed; otherwise, the manufacturer's RAG could be used for this purpose, or operators may develop other methods as long as they achieve the same objectives.

Consideration 8.

Once the airworthiness inspector having oversight responsibilities is satisfied that the operator's continued airworthiness maintenance or inspection program contains all of the elements of the FAA-approved RAG, the airworthiness inspector will approve a maintenance program or inspection program revision. This will have the effect of requiring use of the approved RAG.

In summary, based on discussions with representatives of the affected industry, recommendations from ARAC, and a review of current rules and regulations affecting repair of primary structure, the FAA recognizes the need for a repairs assessment program to be incorporated into the maintenance program for certain transport category airplanes. This final rule accomplishes that.

Discussion of Comments

The FAA received 16 comments in response to Notice 97-16. Commenters included airplane manufacturers, airplane operators, non-U.S. aviation authorities, and aviation industry representatives and groups. The disposition of all comments, grouped by subject, follows.

Support for the Proposal

Several commenters support the proposed rule.

No Need for the Rule

One commenter contends that the proposed rule is largely redundant and may not even be needed. The commenter points out that, in 1978, with amendment 25-45, the FAA amended § 25.571 to impose damage-tolerance criteria for design of aircraft structure. Airplanes certificated after that date have damage-tolerance criteria built in to the manufacturers' repair philosophies. Airplanes older than that are regulated by FAA-approved Supplemental Inspection Documents.

The commenter also points out that, in 1989 (ref. memorandum from Manager, Transport Airplane Directorate, "Policy Regarding Impact of Modifications and Repairs on the Damage-tolerance Characteristics of Transport Category Airplanes," dated November 27, 1989), the FAA clarified that ". . . All transport category airplanes having the damage-tolerance requirements of § 25.571, amendment 25-45, as their certification basis and those with mandated Supplemental Inspection Documents [SID] . . . must continue to maintain their damage-tolerance characteristics when repaired or modified in any way." Industry has adhered to this rendering since that time.

Thus, through the certification rule for new airplanes and through the SID programs for older airplanes, the damage-tolerance assessment of repairs is already being done. For this reason, the commenter does not see a need for the proposed rule and implies that it should be withdrawn.

The FAA acknowledges the commenter's observations, but does not concur that the rule is unnecessary. As discussed in the preamble to the notice (and this final rule), the airplanes certificated after amendment 25-45 must be maintained in accordance with their certification basis and, therefore, a damage-tolerance analysis of all repairs is required. The 1989 memorandum was issued by the FAA to clarify that operators with airplanes subject to the mandated SID programs should continue to maintain the damage-tolerance capabilities of the airplanes when repaired or modified in any way. However,

all operators of the airplanes covered by SSID's have not routinely followed this policy. This fact was made clear by the adoption of Airworthiness Directive (AD) 98-11-03 (Amdt. 39-10530; 63 FR 27455, May 19, 1998) and AD 98-11-04 (Amdt. 39-10531; 63 FR 27456, May 19, 1998) which revised the SSID programs for the Model 727 and 737, respectively. In response to the NPRM's for those AD's, numerous commenters (including the ATA) objected to proposed requirements that repairs be assessed. In part, these objections were based on the argument that operators did not have the records to identify, or the methods to assess existing repairs. The FAA, as well as the AAWG, in developing the repair assessment program, concluded that it is necessary to assess the repairs on all of the affected 11 models of (aging) aircraft to ensure that the original intent of the SID programs (and related AD's mandating them) is being followed.

Manufacturers' Commitments to Providing Documents

Two commenters suggest that adoption of the rule and implementation of the repair assessment program be delayed until the RAG documents, revised SRM's, and service bulletins are available from the manufacturers to affected operators.

One of these commenters states that the FAA should not rely on verbal commitments from the manufacturers to issue these documents sometime in the future. The commenter further states that commitments cannot be depended on, especially where manufacturers are operating with greatly reduced staffs and resources (i.e., due to take-overs). The commenter suggests that, if manufacturers are unable to supply these documents in a timely manner, operators may find themselves in situations where they are not in compliance with this rule.

The other commenter points out that the manufacturer has not provided any information regarding the SRM update schedule for the affected airplanes in this commenter's fleet. The commenter states that, being unable to review the SRM beforehand, raises concerns about possible conflicts between the model-specific RAG document and the corresponding SRM. If the FAA does not delay implementation of the

rule, this commenter requests that an appropriate "grace period" be provided after the SRM's are completely updated so that operators will have time to incorporate the new changes.

The FAA acknowledges these commenters' concerns, but does not agree that a delay is necessary. This final rule is written such that it neither requires the type certificate (TC) holder to develop the guidelines, nor depends on the issuance of any documents from the TC holder to be enforceable. As stated in the preamble to the notice and this final rule, the operator is responsible for providing the RAG applicable to the fuselage external pressure boundary of the airplanes in its fleet. If the TC holder does not or cannot provide relevant service information, the operator may develop, submit, and gain approval of its own guidelines to evaluate repairs to such structure. The information contained in the soon-to-be-released accompanying AC describes one method that may be used by any entity -- operator, TC holder, or otherwise -- to develop such guidelines. Additionally, it is always possible for operators, individually or as a group, to hire the necessary expertise to develop and gain approval of RAG's. Ultimately, however, the operator remains responsible for the continued safe operation of its airplanes.

Further, the FAA also does not concur with the commenter's request that implementation of the repair assessment program be postponed, or a grace period provided, until SRM's are updated to correspond with the RAG documents. The purpose of the two documents is different: the purpose of the RAG document is to assist in evaluating existing repairs; the purpose of the updated SRM is, as is usual, to assist in the installation of new repairs. Operators affected by this new rule will be required to show how new repairs installed after the effective date of the final rule will be handled. The methods described in the soon-to-be-released AC associated with this rule also may be used for this purpose.

The FAA has been advised, however, that as of the date of publication of this rule, the manufacturers have finalized the RAG's applicable to the older airplane models

affected by this rule. The guidelines for the newer models are nearly complete and certainly will be finalized by the time the newer models will require the initial inspections.

Further, the FAA also has been advised that the manufacturers (1) have completed updating the pertinent parts of their Structural Repair Manuals and (2) are ready to provide necessary training programs.

Airplanes Subject to the Final Rule

Airbus Models Subject to Rule: One commenter requests that the listing of affected models of Airbus airplanes in the proposed rule be revised as follows:

> Change references to the Airbus A300 to: "Airbus A300 (excluding the -600 series); and
>
> Clarify paragraph (a)(3) of the proposed § 91.410, § 121.370, § 125.248, and § 129.32 to include references to the Airbus Model C4-200 and F4-200 models.

The FAA concurs with the commenter's first request to exclude the Airbus A300-600 series from the applicability of the rule, and has revised the text of the final rule accordingly. The FAA finds that it is appropriate to exclude the Airbus A300-600 series from the applicability of this rule because this model been certificated to regulatory standards that include the requirements for damage-tolerant structure under § 25.571, as amended by amendment 25-45. As explained earlier, such airplanes are not included in this rulemaking action. An Airworthiness Limitations Section has been approved for the Airbus A300-600 series airplanes, and it is considered a damage-tolerant airplane. Based on the Airbus airplanes currently certificated in the U.S., the following airplanes in the Model A300-600 series would be excluded from compliance with this rule:

> A300 Model B4-600 series,
>
> A300 Model B4-600R series, and
>
> A300 Model F4-600R series.

The FAA does not concur with the commenter's second request to add references to Airbus A300 Model C4-200 and A300 Model F4-200 model airplanes to the applicability of the rule. The C4-200 and F4-200 model airplanes currently are not certified in the U.S. and, therefore, cannot be made part of the rule's applicability.

In light of this commenter's requests, the FAA finds that additional clarification is appropriate as to specify exactly which Airbus A300 airplanes are subject to the requirements of this rule.

In § 91.410, § 121.370, § 125.248, and § 129.32, the FAA delineates the Airbus A300 "Model B2" as a separate model, whose implementation threshold is 36,000 flights. Based on the airplanes currently certified in the U.S. specified in Type Certificate Data Sheet (TCDS) A35EU, the "A300 Model B2" designation referred to in the rule includes:

Model B2-1A,

Model B2-1C,

Model B2K-3C, and

Model B2-203.

If any new "Model B2" airplanes are certificated in the U.S. in the future, those airplanes would be required to follow the implementation time of 36,000 flights above the window line and 36,000 flights below the window line, as outlined in the rule.

Readers also note that, in § 91.410, § 121.370, § 125.248, and § 129.32, the FAA delineates the Airbus A300 "Model B4-100 (including Model B4-2C)" as a separate model whose implementation threshold is 30,000 flights above the window line and 36,000 flights below the window line. Based on the airplanes currently certificated in the U.S. specified in TCDS A35EU, this model designation referred to in the rule includes:

Model B4-103 and

Model B4-2C.

If any new "Model B4-100" airplanes are certificated in the U.S. in the future, those airplanes would be required to follow the implementation time of 30,000 flights above the window line and 36,000 flights below the window line, as outlined in the rule.

Further, in § 91.410, § 121.370, § 125.248, and § 129.32, the FAA delineates the Airbus A300 "Model B4-200." as a separate model whose implementation threshold is 25,000 flights above the window line and 34,000 flights below the window line. Based on the airplanes currently certificated in the U.S. specified in TCDS A35EU, this model designation referred to in the rule is the Model B4-203.

If any new "Model B4-200" airplanes are certificated in the U.S. in the future, those airplanes would be required to follow the implementation time of 25,500 flights above the window line and 34,000 flights below the window line, as outlined in the rule.

Fokker Models Subject to Rule: One commenter states that the AAWG recommended that only the Fokker F28 Mark 1000 through 4000 airplanes were to be affected by this action. The commenter requests that proposed paragraph (l) of the affected regulations be revised to specify this. The proposal includes reference to the Mark 1000C and 3000C models, which is incorrect.

The FAA concurs. The Mark 1000C and 3000C were inadvertently added to the applicability of the proposed rule. References to those models have been deleted from the final rule.

Boeing Models Subject to Rule: Another commenter requests clarification as to whether the Boeing Model 737-300 is affected by the proposed rule. The commenter notes that the Boeing 737 Repair Assessment Guidelines appear to address only the -100 and -200 models, whereas the proposed rule appears to include the -300.

The FAA points out that the Boeing 737-300 is included in the applicability of the rule, as are all models of the Boeing 737. The manufacturers usually produce documents for the older airplanes first before they produce documents for the newer model airplanes. Boeing has advised the FAA that it will produce RAG's for all the models of the Boeing

737. Boeing is expected to produce the documents based on how soon the fleet leaders for a specific model will reach the mandated implementation time. The operators should maintain close contact with the manufacturers to obtain a schedule of when the model-specific RAG's will be produced.

General Applicability of the Rule: Another commenter notes that the proposed rule did not mention the "later design" airplanes, that is, airplanes that are certified to § 25.571, amendment 25-45, or later. The commenter requests clarification as to whether these airplanes would be affected by the proposed rule.

The FAA concurs with the commenter's observation that the proposal did not mention the term "later design [airplanes]." The FAA infers that the commenter uses this term to refer to airplanes certificated after the time that amendment 25-45 became effective. As explained previously, damage-tolerance requirements were introduced into the airplane design in post-amendment 25-45 airplanes, and the certificate holder is required by the amendment to return repaired airplane structure to the original certification basis by installing only those repairs that meet the airplane's damage-tolerance certification basis. In light of the fact that damage-tolerance is "designed into" the post-amendment 25-45 airplanes, the FAA considers it unnecessary to include those airplanes in this rule. This final rule, therefore, applies to those airplanes whose certification basis was approved before amendment 25-45 became effective, and were not designed with requirements for damage-tolerant structure. [The FAA points out, however, that the AAWG did recommend continued monitoring of repairs on the newer ("later design") airplanes, and additional rulemaking if conditions warrant.]

Areas of Inspection

One commenter requests that the FAA clarify the proposed rule to indicate that the area of inspection termed the "fuselage pressure boundary" includes not only the fuselage skin and bulkhead web, but the door skin as well.

The FAA concurs. The intent of the repair assessment is to include the entire fuselage pressure boundary, which does include, among other things, the fuselage, bulkhead webs, and the door skin. (The preamble to the proposal, in fact, did refer to assessment of modified structure relevant to large cargo doors.) The rule has been revised for clarity as suggested by the commenter.

Effective Date of the Rule

One commenter requests that the effective date of the final rule be changed to at least one year after each of the model-specific RAG documents is officially approved and published. The commenter further requests that an additional grace period be added to allow operators the time for preparation work before starting a new complicated program like the repair assessment program and time to train their personnel. The commenter states that none of the model-specific RAG's developed by manufacturers have been officially approved yet by the FAA, and it is difficult for the operators to review and prepare for implementing the program without the actual guideline materials in hand. To justify this request, the commenter points out that the FAA previously provided similar extended compliance times for incorporating other complex programs such as the CPCP and the SSID programs.

The FAA does not concur that a revision to the effective date of the final rule is appropriate. As it is written, the rule does allow a "grace period" of one year after the effective date for operators to implement the program. (This is similar to the provisions of the CPCP and SSID programs.) The FAA also points out that operators and airlines have had the opportunity to work with the manufacturers in the development of the guidelines over the past 6 years. The FAA already has reviewed the RAG documents for 9 of the 11 models affected by the rule and has found that they would satisfy the intent of the rule; the FAA will approve these RAG documents when the rule becomes effective. However, even if these documents are not approved, the rule places the onus on the operators to have guidelines and a program in place. The airframe manufacturers are

providing the RAG documents as a "service" to their customers. However, if the manufacturer does not have a RAG document available, the operator would still be required to develop repair assessment guidelines. Therefore, tying the compliance time of the rule in any way with the date of publication of the manufacturers' documents is immaterial.

Another commenter requests that the proposed implementation time be increased from l year to 18 months to allow manufacturers adequate time "to respond to the new rule." The commenter is concerned that the proposed rule will be implemented sooner than the manufacturers can support the operators with inspection thresholds and repeat inspection intervals for multiple repair configurations, Service Bulletin repairs, and SRM repairs.

The FAA does not concur that additional calendar time for implementation is appropriate. The FAA has reached this conclusion for several reasons:

First, the original notice of this rulemaking provided a 3-month period for public comments. The FAA later reopened the comment period for an additional 3 months to allow the manufacturers time to distribute copies of the RAG's and allow the operators time to review those documents and provide comments.

Second, industry has been aware of the need to assess the damage-tolerance of repairs since at least 1978, when amendment 25-45 was issued to impose damage-tolerance criteria for design of aircraft structure. Airplanes certificated after 1978 have damage-tolerance criteria built in to the manufacturers' repair philosophies. Airplanes certificated before that date are regulated by FAA-approved Supplemental Inspection Documents. The FAA then clarified for the industry in 1989 that all transport category airplanes having the damage-tolerance requirements of § 25.571, amendment 25-45, as their certification basis (i.e., post-1978 certificated airplanes) and those with mandated Supplemental Inspection Document programs (i.e., pre-1978 certificated airplanes) must continue to maintain their damage-tolerance characteristics when repaired or modified in

any way. Industry has been aware of this policy since that time. Thus, the damage-tolerance assessment of repairs is already being done; it is not a new concept. The RAG's have been under development for many years and, during that development, the manufacturers of the affected airplanes have consulted with operators.

Similarly, another commenter requests that additional time be provided before implementation of the assessment program so that regulated aviation community can review, understand, comment on, and assimilate the RAG documents. The commenter claims that "FAA's aggressive schedule on the instant rulemaking has resulted in placing a lot of pressure on the airframe manufacturers to publish the RAG documents as soon as possible." The commenter asserts that, because of this, the documents are of poor quality, with obvious gaps and numerous inconsistencies between them. The commenter maintains that there is a "compelling need" to have these documents reviewed for completion and for inconsistencies within and among them prior to starting the clock for compliance.

The FAA does not concur. Numerous operators have participated in the development of this rule, and have worked closely with the manufacturers in the development of the RAG's. During various working group meetings, the FAA raised the issue of inconsistencies between documents; however, the operators represented at the meetings did not raise any concerns about this. The FAA does not agree that granting more time before implementing this rule will result in the timely resolution of inconsistencies; as long as the repair assessment guidelines meet the intent of the rule, the guidelines are not required to be identical.

Implementation Times

One commenter requests clarification concerning the implementation times of the repair assessment for new repairs. The commenter questions what implementation period would apply for new repairs, assuming that an airplane already has surpassed the flight

cycle implementation time specified for that model, and assuming that the operator has already assessed every applicable repair under the proposed rule.

The FAA clarifies this issue by noting that the operator is required to incorporate an FAA-approved repair assessment program into its maintenance or inspection program, and that this program must include a provision for addressing new repairs. As stated in the final rule, for airplanes that have already exceeded the specified implementation time, the maintenance program must be revised to incorporate the repair assessment program within a year after the effective date of this final rule. Once the program is revised, operators are required to comply with it thereafter, under normal maintenance rules. Therefore, there is no separate "implementation time" for new repairs.

Another commenter requests clarification on the definitions of various phases of the repair assessment program described in the Boeing Model 727 RAG document, D6-56167. Since this commenter's questions are not specifically relevant to this final rulemaking action, they are not included in this preamble. However, the FAA has responded directly to the commenter and a copy of the detailed response is contained in the docket.

Determination of Inspection Intervals

One commenter questions why the proposed rule holds airplanes with mechanical fuselage joints to the same inspection intervals as those whose fuselage joints are assembled with adhesives. The commenter implies that the inspection intervals should be different for each type of these airplanes.

The FAA does not concur. The final rule does not specify any explicit interval for repetitive inspections. Those intervals will be developed based on what is determined to be appropriate for the particular design features of the airplane. These intervals will be specified in the model-specific RAG documents and will be subject to approval by the cognizant FAA Aircraft Certification Office. The only aspect that all airplanes will be

held to is that the inspection intervals must ensure that damage is detected and corrected before failure of a structural repair could occur.

Another commenter requests that the FAA issue a determination in advance stating that the results of SID inspections could serve as an alternative means of compliance with the proposed rule. The commenter asserts that it is unclear how to address an apparent conflict where damage-tolerance analysis done under a SID program, which is mandated by an AD, might render a different inspection schedule from the guidelines in the RAG document.

The FAA does not concur with the commenter's request. The FAA understands that the commenter's concern arises from a scenario such as the following:

> A repair to a principal structural element (PSE) has been accomplished previously.
>
> The operator has an inspection schedule, as part of its SID program, for the repaired PSE based on damage-tolerance analyses.
>
> While assessing the repair of a PSE in accordance with the new RAG document, the operator finds that the inspection schedule under the RAG is more conservative that the SID (i.e., shorter inspection intervals, more frequent inspections).

The FAA does not consider it either necessary or appropriate to issue "an advance determination" that SID inspection results could serve as an alternative method of compliance to the rule for, in fact, they may not. As stated in the preamble to the notice and this final rule, there is the potential that there will be some situations where requirements of the RAG do not agree with those of an AD (especially if the AD were written to address a modification to the airplane made by someone other that the original manufacturer). In those cases, the Federal Aviation Regulations would require that compliance be shown with both the AD and this rule. Such a "dual compliance" situation can be avoided in the long term by working with the manufacturer, if that is the source of

difficulty, or by securing approval of an alternative method of compliance with the AD. In the short term, however, accomplishment of the earlier threshold, the shorter repeat inspection interval, or the more stringent rework/replacement schedule would always constitute compliance with the less stringent requirement. Thus, the operator would not be faced with an unresolvable conflict.

Escalation of Inspection Intervals

One commenter, an airframe manufacturer, requests that the proposed rule be revised to allow a "less restrictive policy" with regard to escalating the repetitive inspection intervals required by the program. This commenter notes that, in approving the RAG documents developed for affected airplanes, the FAA stated that it would approve provisions allowing for escalation of repeat inspection intervals for an individual airplane, but on the condition that each escalation is first approved by the FAA airworthiness inspector on a case-by-case basis. In approving these documents, the FAA indicated that it would not allow (1) any escalation of the inspection threshold or (2) a generally applicable escalation of repetitive inspection intervals.

The commenter maintains that the requirement of gaining prior approval by the FAA airworthiness inspector on a case-by-case basis is more restrictive than similar requirements currently required by other FAA-approved programs, such as the SSID and the CPCP. The SSID program, for example, allows the repeat inspection interval for individual airplanes to be increased by up to 10% of the normal interval. Additionally, the CPCP program allows the repeat inspection interval to be increased by up to 10% (but not to exceed 6 months) in order to accommodate unanticipated scheduling requirements; the operator needs only to notify the cognizant FAA Principal Inspector (P1) in writing of any extension made. This commenter suggests that the approach taken by these programs appears to be a more reasonable method of addressing the escalation of inspection intervals, and asserts that the inspection intervals found in the RAG's all could be increased by 10% and still provide adequate inspections to maintain safety. The

commenter requests that the proposed rule be revised to allow the same escalation policy provided in for the SSID and CPCP programs be applied to the repair assessment program.

The FAA does not concur with the commenter's request. This position is based on experience that the FAA has gained over the years in trying to administer the SSID and CPCP programs. In trying to allow for some flexibility in those programs to accommodate scheduling and other situations, the FAA has found that some affected operators are very confused about the process for escalating the repeat inspection intervals; the FAA also has found that some affected operators abuse the process. The operators themselves pointed this out in the numerous meetings that were held during the development of the repair assessment program. In September 1997, the Manager of the Transport Airplane Directorate issued a memorandum to all cognizant ACO's providing guidance for development of the RAG's. That memorandum addressed areas of concern regarding inspection intervals and established two policies:

> Inspection thresholds shall be fixed and there should be no provisions for escalation of them; and
>
> Repeat intervals can be escalated up to either 10% or a specific time interval specified by the manufacturer, whichever is less. Escalation must be approved by the airworthiness inspector on a case-by-case basis to accommodate one-time scheduling conflicts.

One of the purposes of the memorandum was to ensure standardization of the application of the program across FAA offices. Further, because many operators have various airplane models and multiple TC holders are involved, there was a great desire on the part of the operators to have the repair assessment program standardized as much as possible and be less confusing. As stated previously, operators have been involved in many meetings with the FAA and TC holders as the RAG's were being developed;

therefore, they are aware of the policy regarding escalation and have indicated their agreement with that policy.

New Repairs

One commenter's understanding of the proposed rule is that it would allow the use of the RAG document as a tool to evaluate new repairs. The commenter does not believe, however, that this is in line with the intent of the repair assessment program, which is to serve as a "catch-up" process to "remedy" old repairs and not as a design tool for new repairs. If it is possible to use the RAG to assess new repairs, the commenter foresees a situation where it could be possible to install repairs with a bad damage-tolerance capability and, through the RAG document, to demonstrate that the repair is still "safe" during a certain period. The commenter maintains that, if the proposed rule were to be revised to require that the general guidelines for designing repairs -- as defined in the SRM -- are followed for the new repair installed, then the situation described will certainly not occur. The commenter requests that the proposed rule state that the damage-tolerance assessment of a "new repair" will have to be done through the current recommendations found in the relevant part of the SRM, or the repair assessment will have to be done by a design office (TC holder or other) and approved by the FAA following current procedures.

This commenter justifies this request by stating that all the repairs installed on the pressurized shell boundary will have to be assessed for their damage-tolerance characteristics. The commenter states that, in order to avoid design and installation of "Category C" repairs (temporary repairs that will need to be reworked or replaced prior to an established time limit), operators will need to use the repair instructions and methods described in the updated SRM guidelines. The commenter maintains that this will compel the manufacturer to update its SRM and not to rely only on the RAG document to fulfill its obligations to the operators under this final rule. If the SRM is used in lieu of

the RAG, the approach will be preventive instead of curative and this will, in a certain manner, increase the level of safety.

The FAA recognizes the commenter's point, but does not concur that a revision to the rule is necessary. Existing regulations [e.g., 14 CFR 43.13(b)] already require that all repairs restore the airplane to at least its original or properly altered condition, and those requirements are not affected by this final rule. As discussed previously, this rule simply ensures that the durability of repairs is assessed, and that necessary inspections and rework are accomplished in a timely manner. The TC holders have been devoting resources to update their SRM's, but this process has not proceeded as quickly as hoped; therefore, as an interim measure, the operators can use the RAG document to evaluate their repairs. The FAA considers that use of the RAG document to evaluate temporary repairs will not compromise the repair assessment program required by this final rule.

Classification of Major/Minor Repairs

One commenter questions whether any levels of rework or repairs resulting from the inspections that would be required under the proposed rule would be classified as "major repairs." The commenter suggests that this item be clarified.

The FAA responds by noting that there should be no change regarding the classification of either "major" or "minor" repairs based on the requirements of the new rule. Generally, repairs to PSE's meet the definition of "major" repairs.

Supplemental Type Certificate Holders

One commenter raises a concern about Supplemental Type Certificate (STC) holders and any commitment that they would owe to operators in developing the repair assessment program. Under the proposed rule, an STC holder could quite easily withhold assistance and the operator would have to acquire an FAA-approved RAG independently. The commenter requests that the rule be revised to require the TC holder to assist the operator in assessing whether a repair to an STC modification can be evaluated through the use of the manufacturer's RAG, based on similarity. The TC holder's assistance

should be required to gain approval from the operator's Principal Maintenance Inspector (PMI) or other cognizant airworthiness inspector. If the rule is not changed and the support of the STC holder is not required, significant additional costs could be incurred by the operators.

The FAA does not concur with the commenter's request that the TC holders be required to assist the operators in assessing repairs to STC modifications. Under this rule -- and operating rules in general -- the operator is ultimately responsible for maintenance of its fleet. As discussed in the NPRM, the operator is required to establish a program to assess repairs to modified structure, and may be compelled to contract for the necessary expertise to develop that program.

Relationship of Rule to Operation Specifications

One commenter states that, in a number of places in the preamble to the notice, the phrase, "an operator's operation specification or maintenance program" is used correctly, while in other places only the term "operation specification" is used, which is incorrect. Small operators can be expected to have their maintenance programs incorporated into Section D of the airplane's operation specifications. However, large operators, especially those permitted reliability-based maintenance programs, have only a chapter of their Maintenance Manual listed in Section D of the operation specifications. The commenter requests that the proposed rule be revised to clarify this.

The FAA concurs. The FAA has removed the term "operation specification" and replaced it with "maintenance program" in the appropriate areas of the text of the final rule.

Adjustment for Pressure Factor

One commenter expresses concern that the 1.2 adjustment factor for the Boeing 747SR touch and go allowance, and the allowance for flights with less than 2.0 PSI, were removed from the Boeing 747 RAG document. The commenter requests that the rule specifically permit the use of these pressure factor allowances in the RAG document.

The FAA does not concur. The FAA is concerned about tracking individual airplanes and their usage in order to comply with such an allowance. If the operator submitted a plan on how the airplanes would be tracked and how this information would be transferred in the event the transfer of such an aircraft, the FAA would consider a proposal that could be approved on a case-by-case basis.

Recordkeeping

Several commenters raised concerns about recordkeeping that could necessarily accompany the implementation of the requirements of the proposed rule. In the preamble to the notice, the FAA indicated that the rule would not impose any new FAA recordkeeping requirements, and that the current operating regulations (e.g., 14 CFR § 121.380, "Maintenance recording requirements") already impose adequate recordkeeping requirements that would apply to the actions required by the rule. As discussed below, certain commenters contest that statement:

Transfer of Repair Data: One commenter states that § 121.380 is not an adequate regulation either to mandate the transfer of repair data from one owner to another, or to ensure the transfer of inspection data resulting from the new regulation. The commenter points out that § 121.380 requires that data be retained for only certain periods of time (usually one year), not the lifetime of the airplane. This poses a problem if operators are required to be knowledgeable of all the repairs previously performed on every airplane in its fleet. The commenter asserts that the proposed rule fails to take into consideration that "over half of the commercial airplanes in the U.S. are leased and, therefore, subject to transfer between two U.S. operators." Those involved in such transfers today are well aware that the ability to obtain repair data is dependent on the individual recordkeeping standards of the operators -- how long or how well the operator has kept the data. Moreover, the current regulations do not assist in the acquisition of such data. The commenter suggests that § 121.380 should be revised to require the retention of records

for the lifetime of the aircraft or to exempt repair data from the current "one-year destruction" rule.

The FAA acknowledges the commenter's observations, but does not agree that there is a need either to impose new recordkeeping requirements in conjunction with this rulemaking, or to revise § 121.380. In every case, when an operator purchases an aircraft, it is the operator's responsibility to ensure that the aircraft complies with the operational requirements prior to adding it to its certificate. If pertinent data are not available at the time of the purchase, it normally is the operator's responsibility to go about obtaining the necessary information. In the case of this final rule, if the repair data are not available, an operator may be required to perform an assessment of the aircraft to establish the damage-tolerance of the repairs to the fuselage pressure boundary. The operator could then retain records of this assessment. Generally, the FAA anticipates that availability of necessary repair records will significantly enhance the value of affected airplanes because of the degree to which such records will simplify airplane transfers. Therefore, it is likely that, as a matter of commercial practice, operators will retain those records indefinitely.

Information Actually Retained: One commenter states that, while most U.S. operators agree that records covering "unsuperseded" routine maintenance functions must be maintained, they do not all agree that "non-routine functions resulting from these inspections are equally important." In short, a record that documents the performance of a repair assessment inspection may be kept, but any rework, repairs, etc., resulting from that inspection may not. This is especially true in cases where operators have totally automated their record systems. The commenter suggests that the proposed rule, in actuality, will impose new recordkeeping requirements since operators will have to maintain repair data resulting from inspections.

The FAA acknowledges the commenter's comments. However, the FAA reiterates that, as stated previously, there are no new recordkeeping requirements mandated by this rule. As in any case, operators are required to maintain satisfactory

evidence that they are in compliance with the regulations; this new rule requires nothing in addition to this.

New Methods to Retain/Maintain Repair Data

One commenter states that it has developed an inexpensive software program and has a "U.S. Patented Process" to track new and old repairs completed on aircraft by using digital cameras. The commenter suggests that this product would be an excellent way of tracking aircraft repairs for the proposed repair assessment program.

The FAA infers from this comment that the commenter is suggesting the rule be revised to require the use of such software to maintain repair data. The FAA understands that this software and others like it currently are available on the market. Operators could certainly use these types of products to simplify the retention of the necessary information needed to demonstrate compliance with this rule. However, no change to the rule is necessary to indicate this.

Enforceability of § 129.32

One commenter questions the enforceability of the proposed § 129.32 on operators that are not subject to FAA regulations, specifically non-U.S. operators. The commenter states that, for example, although maintenance program provisions specified in part 129 may be issued by the FAA and provided by the airplane lessor (in the U.S.) to an international lessee, there is "no way to enforce [the lessee's] adherence" to the requirements of that regulation. The commenter asserts that "there are no recordkeeping enforcement provisions for part 129 operators" and, since "they do not operate to 14 CFR, the proposed rule would be meaningless to them." The commenter fears that this could result in the invalidation of the leased airplane's Standard Airworthiness Certificate when it is returned to the U.S.

The FAA does not concur. The rule will be enforceable with regard to part 129 foreign air carriers operating U.S.-registered aircraft into the U.S. As discussed in the preamble to the notice, the new repair assessment program required by § 129.32 will be

approved as part of the foreign air carrier's operations specifications (the maintenance programs will be incorporated into or listed in Section D of the operation specifications). In accordance with § 129.11, part 129 foreign air carriers must conduct their operations in accordance with the operations specifications.

If foreign persons operating U.S.-registered aircraft in common carriage or foreign air carriers operating outside the U.S. do not maintain the aircraft in accordance with U.S. airworthiness standards, or cannot present adequate documentation of such maintenance, then the airworthiness certificate will be invalidated. A prudent aircraft owner will insist, as a matter of contract, that the repairs and maintenance are adequately documented so that, when the lease is terminated or the airplane sold, the airplane can retain its airworthiness certificate.

Impact on International Trade

One commenter raises three issues concerning the International Trade Impact Assessment that appeared in the preamble to the notice, and the intended effect of the proposed rule on the import and export of airplanes:

First, the commenter questions whether the International Trade Impact Assessment took into account the fact that other nations could emulate this rulemaking action and establish their own similar repair assessment programs. Usually foreign operators maintain considerably better records for such things as repairs than do U.S. operators and if the proposed rule does not require "any new recordkeeping requirements," U.S. operators may be hard-pressed to provide adequate data to support the other country's repair assessment program. The commenter implies that this may be a hindrance to the export of airplanes to those countries.

Second, the commenter asks that, if an imported airplane has never been inspected under a repair assessment program, (1) would its baseline inspection suffice, or (2) does the FAA/AAWG assume that the airplane's next U.S. part 121 operator would be responsible for bringing it up to the standards of the proposed rule prior to operation?

The commenter notes that there is no FAA checklist of items that require action prior to issuance of a Standard Airworthiness Certificate, but an airplane being imported must meet the requirements of parts 21, 43, and 91 to obtain a Standard Airworthiness Certificate. The commenter states that the proposed change to § 91.410 would establish deadlines that could preclude the issuance of the certificate prior to an airplane being added to a part 121 operator's fleet.

Third, the commenter considers that the AAWG did not possess the necessary expertise that would come from experience in the transfer of airplanes, to reach the conclusion that the proposed rule would not affect the import or export of airplanes to or from the U.S. The commenter implies that the International Trade Impact Assessment statement that appeared in the preamble to the notice is incorrect.

The FAA does not concur with the commenter. The information provided in the International Trade Impact Assessment states only that the proposed rule would not constitute a "barrier to international trade, including the export of American airplanes to foreign countries and the import of foreign airplanes into the United States." Despite the condition that an airplane is in when imported to the U.S., a part 121 operator will still be responsible for ensuring compliance with the repair assessment requirements -- as well as with every other applicable regulation -- prior to putting the airplane into operation. While this may entail additional work on the part of the operator, it does not constitute a "barrier to international trade." In fact, it is general practice for the importing operator to ensure the airplane is in compliance with all applicable regulations of the importing country.

Regarding the effect on exports, as indicated previously, the FAA anticipates that, as a commercial practice, operators will retain repair assessment records to facilitate future transfers. Assuming that foreign civil aviation authorities adopt requirements similar to this final rule, these records would also be sufficient to meet those requirements.

As for the qualifications of the AAWG, the FAA points out that the AAWG is comprised of representatives from the aviation industry both in the U.S. and foreign countries; this includes manufacturers, airlines, leasing companies, industry associations, unions, and non-U.S. civil aviation authorities. These representatives are some of the most experienced individuals in aviation worldwide who possess far-reaching expertise in numerous relevant areas. Their qualifications are incomparable and, as demonstrated in their work as part of AAWG, their knowledge and capabilities are considerable.

Proposed Regulatory Evaluation

One commenter states that the proposal grossly underestimates the cost impact it will have on operators. The commenter states that one operator, who manages a fleet of about 10 percent of the affected U.S. fleet, has assessed the potential impact of the proposed program on its staffing requirements as follows:

> If only 12 repairs per airplane require assessment under the program, the total number of repairs for a fleet of 356 airplanes will be 4,272.
>
> Approximately 4 engineering hours (at $55 per hour) would be required for each initial assessment. Based on this figure, the total number of work hours could be as many as 17,088, costing over $900,000.
>
> If half the number of repairs would require evaluation beyond the scope of existing manufacturers' documents, engineering support would be twice the level of the ordinary initial assessment and, thus, an additional cost of $900,000 could be expected.
>
> Repetitive inspections resulting from the program will add another $2.3 million in costs and over 10,000 hours of out-of-service time.

The total estimated cost for this single operator is at least $4.1 million, and the loss of service of three airplanes out of the fleet for the remainder of their operational lives. If the airline elects to replace the lost capacity, additional costs on the order of $300 million will be incurred. While one carrier may elect not to replace lost capacity

and allow the lost traffic to go to competitors, the industry as a whole cannot take this strategy. If all operators opted not to add capacity, load factors would have to grow. At over 70%, load factors are already at an all-time high, and production is at its limits. As a result, there would be a severe degradation in service to the public, as more travelers would be forced into second and third choices involving indirect routing and higher fares. The implied total U.S. cost would then be at least $40 million, and potentially as much as $3 billion more to replace lost capacity.

The commenter avers that cost analysis indicated by FAA fails to recognize that the extensive repair analyses and additional repetitive inspections on airplanes will force many airplanes to be pulled out of normal rotations to complete the required work; the resulting out-of-service time will wreak havoc on airline schedules. The commenter points out that the potential impact on system capacity has not been addressed by the FAA and should be adequately treated prior to adopting the proposed rule. Moreover, the commenter states that the FAA does not address the potential redundancy of the requirements with regard to existing Supplemental Structural Inspection Programs and airworthiness directives that also result in damage-tolerance evaluation of structural repairs. The commenter requests that the FAA initiate and complete a more formal cost-benefit evaluation of the proposed action, and make it available to the public for review and comment, prior to taking final action.

The FAA does not concur with the commenter's conclusions concerning the economic impact of this rule, or the need to provide additional time for public comment on the cost-benefit evaluation. A summary of the final economic evaluation appears in the Regulatory Evaluation Summary section of this document. The summary provides details of the FAA's final determination as to the economic impact and cost-benefit of this final rule. The full final economic evaluation can be found in the public docket. The FAA's response to specific points brought up by the commenter in its arguments is as follows.

The commenter used the figure of 4 engineering hours as the number of hours necessary to carry out each initial assessment. According to the commenter, this figure was based on one operator's estimate. The FAA used a figure of 1 engineering hour for an initial assessment; this figure was based on estimates provided by members of the AAWG group associated with this rule, who had arrived at the figure from the input from several operators and others in pertinent aviation fields. The FAA considers the 1 hour figure more feasible due to the fact that it represents data obtained from a wider range of entities affected by this rule.

The commenter estimated that repetitive inspections would add another $2.3 million in costs and over 10,000 hours of out-of-service time. The FAA does not consider those figures to be appropriate. With regard to the $2.3 million, the commenter made no mention of using discounted values; therefore, the FAA assumes that the $2.3 million figure is represented in current values/prices. However, the inspections are to take place in the future – and they would need to be discounted to present values. This would substantially reduce their magnitude in present value.

With regard to the 10,000 hours of out-of-service time, the commenter made no mention of accomplishing the inspections required by the rule during a regularly-scheduled C- or D-check. The use of the C- and D-checks to carry out inspections would significantly reduce or effectively eliminate the out-of-service time.

In its proposed economic evaluation, the FAA carried out cost estimates for operators by using 1 hour for the accomplishment of the initial assessments, and 2 hours for carrying out supplemental inspections. The assessments and inspections also were assumed to take place during C- or D-checks. The cost estimates thus derived were subsequently discounted to present day values – since the assessments and inspections would not take place today but at some years in the future.

The commenter considers the rule to be largely redundant and not needed because the current certification regulations for new airplanes, and the Supplemental Structural

Inspection Programs (SSIP) for older airplanes, already accomplish the intent of a damage-tolerance assessment of repairs that would be required by the rule. The FAA does not concur with the commenter's assumption and has explained, in both the preamble to the notice as well as this preamble, the reasons why this rule is essential. To reiterate: The Supplemental Structural Inspection Programs for existing airplanes, including nearly all of the airplane models affected by this new rule, were mandated by Airworthiness Directives (AD) beginning in 1984. The majority of those AD's did not attempt to address issues relating to the damage tolerance of repairs that had been made to the airplanes; therefore, one of the objectives of this new rule is to provide that same level of assurance for areas of the structure that have been repaired.

The practice of damage-tolerance methodology has evolved gradually over the last 20-plus years. Because a regulatory requirement for damage-tolerance was not applied to airplane designs type certificated before 1978, the damage-tolerance characteristics of repairs that currently exist on airplanes may vary widely and are largely unknown. Further, some repair designs contained in the airplane manufacturers' Structural Repair Manuals (SRM) were not designed to current standards, and repairs accomplished in accordance with those SRM's may require additional inspections if evaluated using current methodologies. This new rule will ensure that those inspections are accomplished and that repairs are brought up to standards, if necessary.

Terminology Changes in Final Rule

The FAA has revised certain terminology that appeared in the proposed introductory text of § 91.410 and § 125.248. The provisions of those sections, as they appeared in the proposal, included the phrase "No certificate holder may operate . . ." However, in this final rule, that phrase has been replaced with "No person may operate . . ." in order to conform with the terminology used throughout parts 91 and 125.

Additionally, the FAA has replaced this same terminology in the text of § 129.32 with "No foreign air carrier or foreign persons operating a U.S.-registered airplane may

operate . . .” This change has been made in order to correctly reflect the operators who are affected by this section of the regulations.

The FAA also has revised certain other wording in the introductory text of §§ 121.370, 125.248, and 129.32. The proposed text in each of those sections stated that none of the affected airplanes could be operated beyond the specified time(s) “. . . unless its operation specifications have been revised to reference repair assessment guidelines. . .” This text in the final rule has been revised to state “. . . unless operations specifications have been issued to reference repair assessment guidelines. . .” This change is necessary to correctly reflect the interface of this rule with the operations specifications process.

Additionally, in the proposal, the introductory text for each of the proposed regulations indicated that approval of the repair assessment guidelines could be granted only by the FAA Aircraft Certification Office (ACO) having cognizance over the type certificate for the affected airplane. The FAA has revised this text in the final rule to indicate that there are FAA offices other than ACO’s that have cognizance over type certificates and, therefore, those office may approve the repair assessment guidelines.

Paperwork Reduction Act

In accordance with the Paperwork Reduction Act of 1995 [44 U.S.C. 3507(d)], the FAA has determined that there are no requirements for information collection associated with this final rule.

International Compatibility

In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to comply with International Civil Aviation Organization (ICAO) Standards and Recommended Practices to the maximum extent practicable. The FAA determined that there are no ICAO Standards and Recommended Practices that correspond to these regulations.

Regulatory Evaluation Summary

Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Office of Management and Budget (OMB) directs agencies to assess the effect of regulatory changes on international trade. And fourth, the Unfunded Mandates Reform Act of 1995 (Pub. L. 104-4) requires agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local, or tribal governments, in the aggregate, or by private sector, or $100 million or more annually (adjusted for inflation).

In conducting these analyses, the FAA has determined that this rule is not "a significant regulatory action" as defined under section 3(f) of Executive Order 12866 and, therefore is not subject to review by the Office of Management and Budget. The rule is not considered significant under the regulatory policies and procedures of the Department of Transportation (44 FR 11034, February 26, 1979). This rule will not have a significant impact on a substantial number of small entities and will not constitute a barrier to international trade.

These analyses, available in the docket, are summarized below.

Costs to Manufacturers

This section presents the FAA's estimate of costs to the four manufacturers of the airplane models affected by the rule. The FAA has conservatively included estimates of costs to non-U.S. manufacturers (i.e., Airbus Industrie, British Aerospace, and Fokker Aircraft B. V.), although only those costs to U.S. manufacturers are required to be estimated. Manufacturers will incur one-time, "set-up" costs to:

1. revise their SRM and to develop RAG's to reflect damage-tolerant repair considerations;

2. publish the revised SRM and the RAG's; and

3. train their engineers, personnel of the operator, and the FAA to conduct repair assessments.

Manufacturers also will incur continuing program maintenance costs of:

- maintenance of records for the program,
- additional training and subsequent revisions to the SRM, and
- assessments of unusual repairs that are not described in the published guidelines.

The total one-time, set-up costs are estimated to be $10.8 million in the year 2000. Total annual, recurring costs for the years 2001 through 2022 are estimated to be $28.7 million, or about $1.3 million per year. The total non-discounted costs of the rule to affected manufacturers are estimated to be $39.5 million over the years 2000 through 2022, or $25.2 million discounted to present value at 7 percent.

The estimates are based on an effective date of 2000. The FAA assumes that the manufacturers' costs of setting up their repair assessment programs would be incurred in the year 2000, and that annual costs would be incurred each year beginning in 2001 through 2022. The setting-up costs include the cost of revising Structural Repair Manuals and developing repair assessment guidelines for some models, the cost of publishing these documents, and the cost of training. Costs are expressed in constant dollars.

Costs to Operators

Operators will incur costs to:

- train inspectors,
- integrate the repair assessment program into the maintenance program for each affected model,
- conduct repair assessments and supplemental inspections, and

- maintain records of assessments and inspections.

Because repair assessments and supplemental inspections are assumed to be conducted during regularly scheduled C- and D-checks, the FAA has not attributed any downtime costs. The FAA estimates that it takes between 25 and 30 people, working three shifts per day, 10 to 14 days to conduct a C-check. The FAA also estimates that it takes between 30 and 40 people, working three shifts per day, three to seven weeks to conduct a D-check. The relatively brief time to conduct a repair assessment or a supplemental inspection check could be incorporated into a C- or D-check without additional loss of service.

- Fleet Data and Noise Restrictions**:** The FAA used Airclaims fleet data to estimate operators' costs to conduct repair assessments and inspections. Airplane-specific cumulative and current annual flight cycles and flight hours for all U.S.-registered airplanes affected by the program were used to predict each airplane's "threshold" date (i.e., the date on which the proposed flight cycle implementation time is reached). The analysis includes affected U.S.-registered airplanes that are operated by foreign entities. The threshold, or flight implementation time, is 75 percent of the original equipment manufacturer's design service goal. Information received from several of the affected manufacturers confirmed the accuracy of the database.

Noise restrictions on airplanes also have an impact on the estimate of the number of airplanes affected by the rule. Because of noise restrictions, as of January 1, 2000, Stage 1 and Stage 2 airplanes will no longer be allowed to operate in the continental United States; and the FAA assumes that U.S. operators will either retire or sell to foreign entities those models that are exclusively Stage 1 or Stage 2 airplanes. This relates to airplanes such as the BAC 1-11 and Fokker F-28.

The database of airplanes used for this analysis includes data that are effective as of January 1, 1999. To carry out calculations, the FAA assumed that airplanes in that database that still had Stage 2 hush kits would not be equipped with Stage 3 hush kits by

the end of 1999. These airplanes were, thus, not included in the calculations. The FAA recognizes that an underestimate of the number of airplanes with Stage 2 hush kits may thus occur; however, the FAA believes that number to be small and indeterminate. This estimate includes both N-registered airplanes operated by airlines as well as by non-airline entities, but does not include any additional airplanes that might be imported. It also does not include future production (i.e., "new") airplanes that may reach the threshold before 2022, the estimate of which would be highly tenuous and whose present value costs will be low or zero.

- Repair Assessment and Supplemental Inspection Costs**:** The activities involved in the entire repair assessment program can be classified into three basic stages. The first stage requires that a certificate holder (i.e., an operator) incorporate a repair assessment program into its maintenance or inspection program by the time that an airplane, for that particular model, reaches its flight cycle implementation time (e.g., the threshold) or within one year from the effective date of the rule – whichever occurs later. The actual outcome between these two possibilities is affected by the actual number of flight cycles in relationship to the design service goal of the airplane at the effective date of the rule.

The second stage involves repair assessments. This work is to be conducted, for individual airplanes, within the D-check or C-check flight cycle interval after the first stage. The D-check interval is used for airplanes whose flight cycles will not have exceeded their design service goal by the effective date of the rule. The C-check interval is used for those airplanes that will have exceeded their design service goal by the effective date of the rule. In this second stage, the previous repairs to the fuselages of the affected airplanes are assessed, by operators' maintenance personnel, to check whether they meet the damage-tolerance criteria. If they do, additional work is not required. If they do not, these repairs are to be repaired again and brought up to the expected quality.

During the third stage, these repairs are to be inspected at the C-check interval of that particular airplane model.

With regard to specific chronology, given an expected effective date of the rule of 2000 and the requirements in the rule, the repair assessment will be conducted at the next heavy maintenance D-check after January 1, 2001, or after the threshold, whichever occurs later. For those airplanes that have exceeded the design service goal, by the effective date of the rule, the repair assessment will be conducted at the next C-check after January 2001.

The AAWG estimated the number of repairs for airplanes, in each affected airplane model, that would require assessment at the appropriate date, and the number of those repairs that would require supplemental inspections. The AAWG also estimated that it would take 1 hour to assess a repair and 2 hours to inspect a repair. For supplemental inspections, the AAWG estimated that 1/2 of the repairs would require inspections during every C-check, while the other half would require inspections during every fourth C-check. Manufacturers and operators provided information on the average number of flight hours between C-checks and D-checks, by affected model. The AAWG estimated that affected airplanes would continue to be operated for 10 years beyond the dates of their repair assessments.

The FAA has estimated operator compliance costs for repair assessment and supplemental inspections through the year 2022 to be $17.4 million, or $6.0 million, discounted to present value.

· Training Costs: Operators of affected U.S.-registered airplanes will incur costs in order to train their maintenance personnel to assess and inspect repairs. Moreover, it is expected that, rather than train their own maintenance personnel, operators with only a few affected airplanes will likely contract out assessments and inspections with other operators whose maintenance personnel have been trained to conduct these activities.

The FAA assumes that training costs for operators' maintenance personnel would be incurred in 2000. Moreover, in order to account for turnover among maintenance personnel trained for repair assessment, the FAA estimates that operators would incur annual training costs, equal to 5 percent of the 2000 training costs, for each year from 2001 through 2022. Operators' costs for training are described in more detail in the full regulatory evaluation.

The FAA estimates that total training costs over the years 2000 through 2022 will be $869,842, or $643,279 discounted to present value.

- Administrative Costs of the Repair Assessment Program**:** The rule will require each affected operator to integrate a repair assessment program into either its maintenance program (for affected airplanes operated under part 121 or 129) or its inspection program (for affected airplanes operated under part 91 or 125) by the time the threshold is reached or within one year from the effective date of the proposed rule, whichever is later. The repair assessment program can include such information as:
    - the scope of the assessment;
    - relevant Airworthiness Directives (AD) and Service Bulletins (SB);
    - the means to identify, assess, and inspect repairs; and
    - procedures to maintain records of each airplane's repair survey, assessments, and supplemental inspections.

Costs to operators for program administration are estimated to total $0.7 million, or $0.3 million discounted to present value.

Based on estimates of manufacturers, operators, the AAWG, and the FAA, over the years 2000 through 2022, operators of airplanes affected by the proposed rule are expected to incur total costs of $19.0 million, or $6.9 million discounted to present value. Repair assessments and supplemental inspection costs account for about 92 percent of total costs and 86 percent of present value costs.

Costs to the FAA

The rule requires FAA approval of repair assessment programs. Aircraft Certification Offices (ACO) will review repair assessment guidelines for airline and non-airline operators. The FAA Principal Maintenance Inspectors (PMI) will review the maintenance programs for their assigned airlines to ensure implementation and compliance with the repair assessment program. In addition, PMI's and other FAA inspectors also will be trained to conduct repair assessments and supplemental inspections. It is estimated that the total cost to the FAA will be $548,353, or $344,695 discounted to present value.

Total Costs of the Rule

Total costs of the rule to manufacturers, operators, and the FAA are estimated to be $59.1 million over the years 2000 through 2022, or $32.5 million in present value.

Benefits

Based on available data, no accidents have been caused by the failure of structural repairs to airplanes of the models affected by the rule. Nevertheless, these airplanes are being operated beyond their design service objective and the FAA has determined that the repair assessment program is needed to maintain the continued airworthiness of these aging airplanes. The FAA is unable to determine the number of accidents that would be prevented by this rule. However, only one serious accident needs to be avoided in order to offset the total cost of the rule. Based on the International Aircraft Price Guide [Summer 1994; Airclaims Limited: London, England], the FAA estimated that the weighted average value of an affected airplane is $10.8 million, in constant dollars. Using a conservative load factor of 63 percent for passenger airplanes and accounting for those airplanes that are operated in cargo service, the weighted average number of occupants is 103. Using $2.7 million as the statistical value of a fatality avoided, the average cost of an accident to an affected airplane resulting in the loss of the airplane and half of its occupants, would be $150.9 million, including $1 million for accident

investigation. If this accident occurred halfway between the first and last year of repair assessments in this analysis (i.e., between 2001 and 2022), the present value of benefits is estimated to be $46.8 million.

Benefits Compared To Costs

The benefits of the rule are estimated at $46.8 million, at present value, while the costs of the rule are estimated at $32.5 million at present value. The FAA, therefore, has determined that if the rule prevents one “average” accident, the repair assessment program will be cost-beneficial.

Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) of 1980, 5 U.S.C. 601–612, directs the FAA to fit regulatory requirements to the scale of the business, organizations, and governmental jurisdictions subject to the regulation. We are required to determine whether a proposed or final action will have a "significant economic impact on a substantial number of small entities" s defined in the Act. If we find that the action will have a significant impact, we must do a "regulatory flexibility analysis."

This final rule will affect manufacturers and operators of airplanes, in the specified parts of the CFR. For both manufacturers and operators, a small entity is currently defined as one with 1,500 or fewer employees. None of the airplane manufacturers that are affected by this final rule have employee levels that fall below this employment threshold. Consequently, the FAA certifies that the final rule will not have a significant economic impact on a substantial number of manufacturers of airplanes.

Some operators, however, do have employee levels that fall below the employment threshold. Consequently, calculations were carried out to assess whether the rule will have a significant impact on a substantial number of these operators. These calculations Showed that the annualized cost of the rule is very small in comparison to

annual revenues of the affected entities – considerably smaller than 1 percent of their revenues Consequently, the rule will not have a significant impact on small operators.

International Trade Impact Assessment

The provisions of this rule will have little or no impact on trade for U.S. firms doing business in foreign countries and foreign firms doing business in the United States.

Executive Order 13132, Federalism

The FAA has analyzed this final rule under the principles and criteria of Executive Order 13132, Federalism. We determined that this action will not have a substantial direct effect on the States, on the relationship between the national Government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, the FAA has determined that this rule does not have federalism implications.

Unfunded Mandates Analysis

Title II of the Unfunded Mandates Reform Act of 1995 (the Act), codified as 2 U.S.C. 1501–1571, requires each Federal agency, to the extent permitted by law, to prepare a written assessment of the effects of any Federal mandate in a proposed or final agency rule that may result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $100 million or more (adjusted annually for inflation) in any one year. Section 204(a) of the Act, 2 U.S.C. 1534(a), requires the Federal agency to develop an effective process to permit timely input by elected officers (or their designees) of State, local, and tribal governments on a proposed "significant intergovernmental mandate." A "significant intergovernmental mandate" under the Act is any provision in a Federal agency regulation that would impose an enforceable duty upon State, local, and tribal governments, in the aggregate, of $100 million (adjusted annually for inflation) in any one year. Section 203 of the Act, 2 U.S.C. 1533, which supplements section 204(a), provides that before establishing any regulatory requirements that might significantly or uniquely affect small governments, the agency shall have developed a

plan that, among other things, provides for notice to potentially affected small governments, if any, and for a meaningful and timely opportunity to provide input in the development of regulatory proposals.

This rule does not contain a Federal intergovernmental or private sector mandate that exceeds $100 million in any one year.

Environmental Analysis

FAA Order 1050.1D defines FAA actions that may be categorically excluded from preparation of a National Environmental Policy Act (NEPA) environmental assessment or environmental impact statement. In accordance with FAA Order 1050.1D, appendix 4, paragraph 4(j), this rulemaking action qualifies for a categorical exclusion.

Regulations Affecting Intrastate Aviation in Alaska.

Section 1205 of the FAA Reauthorization Act of 1996 (110 Stat. 3213) requires the Administrator, when modifying regulations in Title 14 of the CFR in a manner affecting intrastate aviation in Alaska, to consider the extent to which Alaska is not served by transportation modes other than aviation, and to establish such regulatory distinctions as he or she considers appropriate. Because this amendment applies to the operation of certain transport category airplanes under parts 91, 121, 125, and 129 of Title 14, it could affect intrastate aviation in Alaska. Because no comments were received regarding this regulation affecting intrastate aviation in Alaska, the FAA will apply the rule in the same way that it is being applied nationally.

Energy Impact

The energy impact of the rule has been assessed in accordance with the Energy Policy and Conservation Act (EPCA) Pub. L. 94-163, as amended (43 U.S.C. 6362) and FAA Order 1053.1. It has been determined that the final rule is not a major regulatory action under the provisions of the EPCA.

List of Subjects

14 CFR Part 91

Aircraft, Aviation safety, Federal Aviation Administration, Reporting and recordkeeping requirements

14 CFR Part 121

Air carriers, Aircraft, Aviation Safety, Federal Aviation Administration, Reporting and recordkeeping requirements, Safety, Transportation

14 CFR Part 125

Aircraft, Aviation safety, Federal Aviation Administration, Reporting and recordkeeping requirements

14 CFR Part 129

Air carriers, Aircraft, Aviation Safety, Federal Aviation Administration, Reporting and recordkeeping requirements

The Amendment

In consideration of the foregoing, the Federal Aviation Administration amends parts 91, 121, 125, and 129 of Title 14, Code of Federal Regulations as follows:

PART 91 - GENERAL OPERATING AND FLIGHT RULES

1. The authority citation for part 91 continues to read:

Authority: 49 U.S.C. 106(g), 40103, 40113, 40120, 44101, 44111, 44701, 44709, 44711, 44712, 44715, 44716, 44717, 44722, 46306, 46315, 46316, 46502, 46504, 46506-46507, 47122, 47508, 47528-47531.

2. Add a new § 91.410 to read as follows:

§ 91.410 Repair assessment for pressurized fuselages.

No person may operate an Airbus Model A300 (excluding the -600 series), British Aerospace Model BAC 1-11, Boeing Model 707,720, 727, 737 or 747, McDonnell Douglas Model DC-8, DC-9/MD-80 or DC-10, Fokker Model F28, or Lockheed Model L-1011 airplane beyond the applicable flight cycle implementation time specified below,

or [a date one year after the effective date of the amendment], whichever occurs later, unless repair assessment guidelines applicable to the fuselage pressure boundary (fuselage skin, door skin, and bulkhead webs) that have been approved by the FAA Aircraft Certification Office (ACO), or office of the Transport Airplane Directorate, having cognizance over the type certificate for the affected airplane are incorporated within its inspection program:

(a) For the Airbus Model A300 (excluding the -600 series), the flight cycle implementation time is:

(1) Model B2: 36,000 flights.

(2) Model B4-100 (including Model B4-2C): 30,000 flights above the window line, and 36,000 flights below the window line.

(3) Model B4-200: 25,500 flights above the window line, and 34,000 flights below the window line.

(b) For all models of the British Aerospace BAC 1-11, the flight cycle implementation time is 60,000 flights.

(c) For all models of the Boeing 707, the flight cycle implementation time is 15,000 flights.

(d) For all models of the Boeing 720, the flight cycle implementation time is 23,000 flights.

(e) For all models of the Boeing 727, the flight cycle implementation time is 45,000 flights.

(f) For all models of the Boeing 737, the flight cycle implementation time is 60,000 flights.

(g) For all models of the Boeing 747, the flight cycle implementation time is 15,000 flights.

(h) For all models of the McDonnell Douglas DC-8, the flight cycle implementation time is 30,000 flights.

(i) For all models of the McDonnell Douglas DC-9/MD-80, the flight cycle implementation time is 60,000 flights.

(j) For all models of the McDonnell Douglas DC-10, the flight cycle implementation time is 30,000 flights.

(k) For all models of the Lockheed L-1011, the flight cycle implementation time is 27,000 flights.

(l) For the Fokker F-28 Mark 1000, 2000, 3000, and 4000, the flight cycle implementation time is 60,000 flights.

PART 121 - CERTIFICATION AND OPERATIONS: DOMESTIC, FLAG, AND SUPPLEMENTAL AIR CARRIERS AND COMMERCIAL OPERATORS OF LARGE AIRCRAFT.

1. The authority citation for part 121 continues to read:

Authority: 49 U.S.C. 106(g), 40113, 40119, 44101, 44701-44702, 44705, 44709-44711, 44713, 44716-44717, 44722, 44901, 44903-44904, 44912, 46105.

2. Add a new § 121.370 to read as follows:

§ 121.370 Repair assessment for pressurized fuselages.

No certificate holder may operate an Airbus Model A300 (excluding the -600 series), British Aerospace Model BAC 1-11, Boeing Model 707, 720, 727, 737 or 747, McDonnell Douglas Model DC-8, DC-9/MD-80 or DC-10, Fokker Model F28, or Lockheed Model L-1011 airplane beyond the applicable flight cycle implementation time specified below, or [a date one year after the effective date of the amendment], whichever occurs later, unless operations specifications have been issued to reference repair assessment guidelines applicable to the fuselage pressure boundary (fuselage skin, door skin, and bulkhead webs), and those guidelines are incorporated in its maintenance program. The repair assessment guidelines must be approved by the FAA Aircraft Certification Office (ACO), or office of the Transport Airplane Directorate, having cognizance over the type certificate for the affected airplane.

(a) For the Airbus Model A300 (excluding the -600 series), the flight cycle implementation time is:

(1) Model B2: 36,000 flights.

(2) Model B4-100 (including Model B4-2C): 30,000 flights above the window line, and 36,000 flights below the window line.

(3) Model B4-200: 25,500 flights above the window line, and 34,000 flights below the window line.

(b) For all models of the British Aerospace BAC 1-11, the flight cycle implementation time is 60,000 flights.

(c) For all models of the Boeing 707, the flight cycle implementation time is 15,000 flights.

(d) For all models of the Boeing 720, the flight cycle implementation time is 23,000 flights.

(e) For all models of the Boeing 727, the flight cycle implementation time is 45,000 flights.

(f) For all models of the Boeing 737, the flight cycle implementation time is 60,000 flights.

(g) For all models of the Boeing 747, the flight cycle implementation time is 15,000 flights.

(h) For all models of the McDonnell Douglas DC-8, the flight cycle implementation time is 30,000 flights.

(i) For all models of the McDonnell Douglas DC-9/MD-80, the flight cycle implementation time is 60,000 flights.

(j) For all models of the McDonnell Douglas DC-10, the flight cycle implementation time is 30,000 flights.

(k) For all models of the Lockheed L-1011, the flight cycle implementation time is 27,000 flights.

(l) For the Fokker F-28 Mark 1000, 2000, 3000, and 4000, the flight cycle implementation time is 60,000 flights.

PART 125 - CERTIFICATION AND OPERATIONS: AIRPLANES HAVING A SEATING CAPACITY OF 20 OR MORE PASSENGERS OR A MAXIMUM PAYLOAD CAPACITY OF 6,000 POUNDS OR MORE

1. The authority citation for part 125 continues to read:

Authority: 49 U.S.C. 106(g), 40113, 44701-44702, 44705, 44710-44711, 44713, 44716-44717, 44722.

2. Add a new § 125.248 to read as follows:

§ 125.248 Repair assessment for pressurized fuselages.

No person may operate an Airbus Model A300 (excluding the -600 series), British Aerospace Model BAC 1-11, Boeing Model 707, 720, 727, 737 or 747, McDonnell Douglas Model DC-8, DC-9/MD-80 or DC-10, Fokker Model F28, or Lockheed Model L-1011 beyond the applicable flight cycle implementation time specified below, or [a date one year after the effective date of the amendment], whichever occurs later, unless operations specifications have been issued to reference repair assessment guidelines applicable to the fuselage pressure boundary (fuselage skin, door skin, and bulkhead webs), and those guidelines are incorporated in its maintenance program. The repair assessment guidelines must be approved by the FAA Aircraft Certification Office (ACO), or office of the Transport Airplane Directorate, having cognizance over the type certificate for the affected airplane.

(a) For the Airbus Model A300 (excluding the -600 series), the flight cycle implementation time is:

(1) Model B2: 36,000 flights.

(2) Model B4-100 (including Model B4-2C): 30,000 flights above the window line, and 36,000 flights below the window line.

(3) Model B4-200: 25,500 flights above the window line, and 34,000 flights below the window line.

(b) For all models of the British Aerospace BAC 1-11, the flight cycle implementation time is 60,000 flights.

(c) For all models of the Boeing 707, the flight cycle implementation time is 15,000 flights.

(d) For all models of the Boeing 720, the flight cycle implementation time is 23,000 flights.

(e) For all models of the Boeing 727, the flight cycle implementation time is 45,000 flights.

(f) For all models of the Boeing 737, the flight cycle implementation time is 60,000 flights.

(g) For all models of the Boeing 747, the flight cycle implementation time is 15,000 flights.

(h) For all models of the McDonnell Douglas DC-8, the flight cycle implementation time is 30,000 flights.

(i) For all models of the McDonnell Douglas DC-9/MD-80, the flight cycle implementation time is 60,000 flights.

(j) For all models of the McDonnell Douglas DC-10, the flight cycle implementation time is 30,000 flights.

(k) For all models of the Lockheed L-1011, the flight cycle implementation time is 27,000 flights.

(l) For the Fokker F-28 Mark 1000, 2000, 3000, and 4000, the flight cycle implementation time is 60,000 flights.

PART 129 - OPERATIONS: FOREIGN AIR CARRIERS AND FOREIGN OPERATORS OF U.S.-REGISTERED AIRCRAFT ENGAGED IN COMMON CARRIAGE

1. The authority citation for part 129 continues to read:

Authority: 49 U.S.C. 106(g), 40104-40105, 40113, 40119, 44701-44702, 44712, 44716-44717, 44722, 44901-44904, 44906.

2. Add a new § 129.32 to read as follows:

§ 129.32 Repair assessment for pressurized fuselages

No foreign air carrier or foreign persons operating a U.S. registered airplane may operate an Airbus Model A300 (excluding -600 series), British Aerospace Model BAC 1-11, Boeing Model 707, 720, 727, 737 or 747, McDonnell Douglas Model DC-8, DC-9/MD-80 or DC-10, Fokker Model F28, or Lockheed Model L-1011 beyond the applicable flight cycle implementation time specified below, or [a date one year after the effective date of the amendment], whichever occurs later, unless operations specifications have been issued to reference repair assessment guidelines applicable to the fuselage pressure boundary (fuselage skin, door skin, and bulkhead webs), and those guidelines are incorporated in its maintenance program. The repair assessment guidelines must be approved by the FAA Aircraft Certification Office (ACO), or office of the Transport Airplane Directorate, having cognizance over the type certificate for the affected airplane.

(a) For the Airbus Model A300 (excluding the -600 series), the flight cycle implementation time is:

(1) Model B2: 36,000 flights.

(2) Model B4-100 (including Model B4-2C): 30,000 flights above the window line, and 36,000 flights below the window line.

(3) Model B4-200: 25,500 flights above the window line, and 34,000 flights below the window line.

(b) For all models of the British Aerospace BAC 1-11, the flight cycle implementation time is 60,000 flights.

(c) For all models of the Boeing 707, the flight cycle implementation time is 15,000 flights.

(d) For all models of the Boeing 720, the flight cycle implementation time is 23,000 flights.

(e) For all models of the Boeing 727, the flight cycle implementation time is 45,000 flights.

(f) For all models of the Boeing 737, the flight cycle implementation time is 60,000 flights.

(g) For all models of the Boeing 747, the flight cycle implementation time is 15,000 flights.

(h) For all models of the McDonnell Douglas DC-8, the flight cycle implementation time is 30,000 flights.

(i) For all models of the McDonnell Douglas DC-9/MD-80, the flight cycle implementation time is 60,000 flights.

(j) For all models of the McDonnell Douglas DC-10, the flight cycle implementation time is 30,000 flights.

(k) For all models of the Lockheed L-1011, the flight cycle implementation time is 27,000 flights.

(l) For the Fokker F-28 Mark 1000, 2000, 3000, and 4000, the flight cycle implementation time is 60,000 flights.

Issued in Washington, DC, on April 19, 2000.

Jane F. Garvey

Administrator of Federal Aviation Administration (FAA).